Evaluation of the CUSP Essential Team Behaviors Passport: A Tool for the Comprehensive Unit-based Safety Program (CUSP)

by
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Abstract

A recent report indicated that medical errors were the third leading cause of death in the United States after heart disease and cancer. Efforts toward reducing medical errors and improving patient safety efforts, especially those at the local level are important. The Comprehensive Unit-based Safety Program (CUSP) has been associated with reductions in medical errors, improvements in clinical outcomes such as decreased blood stream infection rates and human resource outcomes such as decreased nurse turnover. While the factors associated with CUSP team strength and patient safety climate improvement are not well understood, CUSP relies on the wisdom of frontline staff to proactively identify and assess both safety defects and potential patient safety risks.

The CUSP program has been in place at Johns Hopkins for more than 10 years. In an effort to encourage patient safety behaviors, the CUSP Essential Team Behaviors Passport (CUSP Passport) was implemented in 2015. The CUSP Passport engages team members in activities that demonstrate essential team behaviors such as collaboration, communication and recognition, analysis and process, education and innovation, and utilization of resources. It was designed to encourage each team to share these activities as evidence of their team behaviors and safety activities. The purpose of this dissertation is to evaluate several components of the CUSP Passport to assess whether we can measure patient safety improvements as a function of the CUSP Passport and whether CUSP teams are able to influence their patient safety and teamwork safety culture scores as a result of completing the CUSP Passport activities.

This study analyzed retrospective data from CUSP teams at Johns Hopkins Hospital and Johns Hopkins Community Physicians (81 teams, JHH = 63 and JHCP = 18). For Aim 1, associations between stronger safety climate and teamwork domain scores in the SCA (2015)

and the number of completed CUSP Passport challenges were compared. We found significant associations between teamwork domain scores and the number of CUSP Passport challenges completed. We found that with each unit increase of time 1 SCA teamwork domain score, the total number of CUSP Passport tasks completed had a 3% increase. For Aim 2, associations between teams with completed CUSP Passport challenges and the change in safety climate and teamwork domain scores for the time 1 SCA (2015) and time 2 SCA (2017) were compared. No significant associations were noted between teamwork or safety domain scores and the number of CUSP Passport challenges completed and changes in the safety climate and teamwork domain scores.

These findings support the conclusion that the CUSP teams with stronger 2015 teamwork domain scores in this sample completed more CUSP Passport challenges than those who do not have strong teamwork domain scores. This underscores the value of conducting this research and the importance of filling in the gaps in the literature for evaluation of CUSP programs and identifying programs that will help CUSP teams improve their completion of safety improvement efforts.

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Chapter 1 – Introduction

Statement of the Problem

The Comprehensive Unit-based Safety Program (CUSP) was established in 2001 after a tragic event involving a toddler suffering what was reported to be avoidable harm at Johns Hopkins Hospital (JHH). The CUSP Program, designed to improve patient safety, provides training and tools for multidisciplinary teams to identify potential harm and work toward improvement of patient safety culture.[1,2,3,4] It does so by valuing the wisdom of frontline staff and supporting teams with an organizational executive working together to improve safety defects identified at the front line of patient care. Evidence suggests that staff learn from mistakes by integrating safety practices and tools into their daily work on a unit or clinical setting.[1] CUSP is implemented at the local level using a multidisciplinary team to proactively identify safety defects, and develop appropriate strategies to fix hazards they perceive as the greatest risks. Safety practices are integrated into daily workflow with the support of training and tools, as teams work toward achieving their safety and quality improvement goals.[1]

While CUSP teams are intended to include all members of the staff in a particular work setting, there are five primary or core team members for each CUSP team. CUSP core team members and their roles are described in Table 1.[2]

Table 1 CUSP Core Team Members

CUSP Core Team Members	
Team Member	**Role Description**
CUSP Coordinator	**The CUSP Coordinator,** a CUSP Expert, helps spread and sustain the organization's CUSP work by developing and supporting the growth and maintenance of strong CUSP teams.

CUSP Facilitator	**The CUSP Facilitator** is someone who contributes structure and process for CUSP teams so groups are able to function effectively and make high-quality decisions. This role also connects CUSP teams to the CUSP Expert group at the organizational level.
CUSP Champion	**The CUSP Champion** is someone on the team at the local level who works to ensure that the vision of CUSP is translated into action and that all staff members are engaged in CUSP work.
Unit Manager	**The Unit Manager,** often a Nurse Manager, plays an essential role supporting a unit's CUSP work by supporting staff time for the safety improvement work and meeting space.
Provider Champion	**The Provider Champion**, often a physician, models leadership for the CUSP team, and demonstrates commitment to the program by actively participating in CUSP work.
Senior Executive	**The Senior Executive** is recruited to be an active member of the CUSP team, partnering with team members so they achieve safety and quality improvement goals and develop problem-solving and leadership skills.

The CUSP Coordinator, a CUSP expert, assumes responsibility for oversight, development and sustaining support for CUSP teams across the organizational level. CUSP core team members include the CUSP Facilitator, CUSP Champion, Unit Manager, Provider Champion, and the Senior Executive. Additional team members are considered within the multidisciplinary team, and should include all members of the staff, the core team members, and may involve additional subject matter experts (SMEs) as needed. SMEs may include Pharmacists, Hospital Epidemiologists, Respiratory Therapists, Human Factors Engineers, Risk Managers, and Environmental Cleaning staff, as well as others. The ability of CUSP teams to accomplish their patient safety initiatives may be influenced by how well team members work together and how well they support each other to accomplish these shared goals.

With the growth of the CUSP program to over 170 active CUSP teams at JHH and affiliates, the supporting infrastructure has expanded from earlier CUSP models to include the

role of a department-based CUSP Facilitator. The CUSP Facilitator is engaged in the process providing department support for structure and process, and supporting communication of critical information to and from the CUSP Core Team at the organizational level. Once CUSP teams have completed the Passport challenges, they are to connect with their CUSP Facilitator or the organization's CUSP Coordinator to share documentation of the validated or newly completed activities.

CUSP teams may struggle to meet their patient safety improvement goals for a variety of reasons, some of which are described here. Team behavior and dynamics may challenge some teams' ability to accomplish safety improvement work as a result of high stress and lack of experience working with multi-disciplinary teams. Many teams find that their safety improvement work cannot be supported with scheduled time, so staff must rely on available time referred to as "down time" or "nonproductive time." This down time will occur when the patient care demands decrease such as when there are extra staff, a planned admission is delayed or a planned discharge occurs earlier than scheduled. Some teams find that they need to collect detailed information in their assessment or measurement of safety defects. These needs for data and the time for data analysis may lack organizational support. Other teams may have a higher turnover or more frequent clinical rotations of key positions on their CUSP teams, negatively influencing a team's ability to accomplish their safety improvement goals. Lack of recognition for the patient safety improvement effort can be influenced by leaders who don't recognize the staff safety achievements. Finally, some CUSP teams struggle to utilize the established CUSP tools in the CUSP toolkit for the full benefit of the team's work either due to lack of education or uncertainty of the tools' value.

While teams are provided CUSP training and a host of tools that have been validated to support patient safety improvement work, there is variable success with the targeted goals.[3,5] Weaver et.al. (2013) identified the complex interventions used in promoting a patient safety culture that include principles of leadership, teamwork, and behavior change. These may involve a single intervention or more of a systems approach to prevent future harm from happening or recurring.[6] CUSP is one of the strategies described by the authors that is unique in partnering adaptive interventions such as team training with technical interventions such as evidence-based practice to improve safety and quality.[7,8] Pronovost et.al.(2006) described the MHA Keystone ICU project goal "to improve patient safety in the ICUs in Michigan" (p.2729).[7] Catheter-related bloodstream infections were reduced up to 60% throughout the study period following a coordinated program including implementation of CUSP and associated tools such as "CUSP Tools: Daily Goals Checklist" and the use of evidence-based interventions to reduce the rate of catheter-related bloodstream infections and the incidence of ventilator-associated pneumonia.[7,9]

When *To Err is Human* was published in 2000 by the Institute of Medicine, now the National Academy of Medicine, it was the first time that the number of deaths associated with medical error was actually quantified. Healthcare leaders and researchers were confronted with the glaring dilemma of how 44,000 – 98,000 deaths per year could happen as a result of apparently preventable adverse events.[9] In fact, many leaders and researchers across the country immediately started to explore strategies for prevention of adverse events and how to address them once they occurred.

Makary and Daniel (2016) describe medical error and its impact on mortality and reporting.[10] In 1993 Lucian Leape wrote that the IOM report underestimates the magnitude of the problem of deaths due to medical error.[11] A 2004 report of inpatient deaths associated with

AHRQ indicators estimated that about 195,000 deaths per year could be attributed to medical error.[12] Classen et al (2011) described a rate of 1.13% of deaths due to medical error that when applied to US hospital admissions in 2013 (AHA, 2015) leads to over 400,000 deaths per year, more than four times the IOM estimate.[13] Medical error has been determined to be the third cause of death in the US and is frequently under-recognized in many countries, where mortality statistics have limited ability to capture the actual cause of death.

Since 2001, over 170 CUSP teams have been established across Johns Hopkins Medicine (JHM), including the affiliate sites – Howard County General Hospital, Johns Hopkins All Children's Hospital, Johns Hopkins Bayview Medical Center, Johns Hopkins Community Physicians (JHCP), Johns Hopkins Hospital (JHH), Sibley Memorial Hospital, and Suburban Hospital. With the largest bed capacity in this system at just over 1,000 beds, Johns Hopkins Hospital (JHH) is the site of the first CUSP teams and the largest number of CUSP teams at 80 at the time of this writing. Appendix 1 includes CUSP team numbers for each of the JHM sites including JHH and affiliate locations. The program is voluntary in nature, growing in number over the past 16 years, and teams have varying reasons for starting a CUSP team in their work setting within JHM, including the common interests of improving patient safety climate and the prevention of patient harm.

The CUSP Team Behaviors Passport

The CUSP Essential Team Behaviors Passport was implemented at the 6th Annual JHM Patient Safety Summit (Summit) in November 2015 (Appendix 2).[14] The CUSP Passport is a tool designed to encourage each team to record evidence of their safety accomplishments while they complete identified team behavior activities working toward completion of the CUSP Passport. CUSP teams who attended the Annual JHM Patient Safety Summit in 2015 received

their copy of the CUSP Passport (Appendix 2) and credit for attending the Summit by the Patient Safety team. CUSP teams who did not attend the Summit were able to retrieve their CUSP Passport from their CUSP Facilitator, the CUSP core team member with responsibility for supporting CUSP teams in like-JHM settings. In addition to providing a record of safety accomplishments by using the CUSP Passport, the tool was implemented with an intent to help CUSP teams develop and strengthen the following team behaviors:

- Problem analysis and problem solving
- Focus, planning and goal development
- Engagement, partnership and collaboration
- Spanning boundaries and developing a system's perspective
- Connecting with leadership
- Recognition of team and developing strength in teamwork
- Building sustainable safety improvement processes
- Messaging and communication
- Demonstrating pride
- Advancing the science
- Learning, sharing, and teaching
- Creativity and Innovation
- Recognition of and utilization of resources
- Implementation of CUSP tools
- Valuing the principles of safe design, and
- Recognizing sources of data

CUSP teams who completed the Passport challenges, 0-24 in total (Appendix 3), were recognized for these accomplishments by receiving stickers to place in their CUSP Passport, much like a travel passport. The first opportunity to earn a sticker in the Passport was titled "Show your team spirit." When units posted a picture of their team in a CUSP Passport folder on Johns Hopkins Box (JHBox), they earned a passport sticker. JHBox is a cloud-based file sharing and storage service which enables staff with a Johns Hopkins log-in (password-protected) to collaborate and share data which can be accessed through devices such as laptop,

phone, or tablet.[15] The team was expected to upload their CUSP Passport project work to the team's page on JHBox and secure a sticker from their CUSP Facilitator.

Although there is evidence that demonstrates the correlation of teamwork on CUSP teams with clinical and behavioral outcome improvements, there has been more focus with specific outcomes in acute settings such as reduction in central line associated blood stream infections (CLABSIs) and improved team communication and plan of care.[16-18] There is little published on the overall evaluation of CUSP showing the relationship between CUSP and improved safety or teamwork domain scores from the safety culture assessment. There has been even less published on the strength of CUSP teams that have been in place for more than a year and the productivity of their patient safety improvement work. Filling an important gap in the peer reviewed literature, this study looked at the relationship between the CUSP Passport challenge and safety culture assessment scores. Specific scores included the teamwork and safety culture domains, a specific teamwork domain question, "People in this work setting work together as a well-coordinated team", and a specific safety culture domain question, "I am encouraged by others in this work setting to report and patient safety concerns I may have." Additional measures include number of Passport challenges completed, the safety and teamwork domain scores on the safety culture assessment over two survey administration periods, and individual question scores in the teamwork and safety culture domains (Appendix 4).

A number of CUSP programs have demonstrated success in patient safety improvement initiatives following the combined investment in technical work such as evidence-based practices and the adaptive work such as training in patient safety, teamwork and communication.[19,20] The CUSP program relies on a strong platform of training and teamwork along with the use of validated tools, in order to meet patient safety improvement goals such as decreased central line

associated bloodstream infection (CLABSI) and decreased surgical site infections (SSI).[19-21] The overall objective of this study "to evaluate the CUSP Essential Team Behaviors Passport Program at JHM and identify correlations with the Safety Culture Assessment (SCA) domains of safety culture and teamwork, and the demonstration of strong team behaviors" is supported by the foundation described.

CUSP teams have been established since 2001, and there is much variability in team strength, completion of CUSP Passport challenges, and safety culture and teamwork domain scores. Organizational factors such as implementation of a major new technology or inconsistent attendance by team members can send the team into a period of diminished productivity for safety work. CUSP Facilitators have struggled with how to encourage the use of teamwork and behaviors that exist within each team in order to achieve common goals in patient safety improvement work. They are challenged in how to influence productivity so that teams ranging from 1-15 years are able to recognize and use their skills to strengthen both the team and patient safety improvement efforts. The overall objective of this analysis is to evaluate the CUSP Essential Team Behaviors Passport Program at JHM and to identify correlations with the Safety Culture Assessment (SCA) domains of safety and teamwork and the demonstration of strong team behaviors.

Theoretical Framework and Conceptual Model

Cohen & Bailey (1997) summarized research on teams from 1990 to 1996 and described the various dimensions of team effectiveness.[22] The authors use a definition of team that is built on the work of multiple authors and applies well to the use of team in an organizational setting.[23-26] "A team is a collection of individuals who are interdependent in their tasks, who share responsibility for outcomes, who see themselves and who are seen by others as an intact social

entity embedded in one or more larger social systems …, and who manage their relationships across organizational boundaries.[22] Team effectiveness is shown as a function of task, group and organization design factors, environmental factors, internal and external processes, and group psychosocial traits. This framework was selected because it presents how group processes can become a part of the group traits, such as group norms and shared mental models. The framework suggests that essential elements of group processes occur both internally and external to the group. The conceptual model has been adapted for this research (Appendix 5, 6).

The adapted conceptual model demonstrates the design and represents the analysis of the CUSP Essential Team Behaviors Passport, an intervention in the CUSP Program. The Passport was created with an intent to positively impact "essential team behaviors." It was anticipated that this intervention would influence internal and external processes uniquely for CUSP teams, depending on their established communication and team behaviors. These processes impact the group psychosocial traits represented by team norms and shared mental models. CUSP team effectiveness in this adapted conceptual model were measured by performance outcomes including: the accomplishment of CUSP Passport challenges, and any improved scores in the teamwork and safety domain and individual question scores on the Safety Culture Assessment.

Study Aims and Hypotheses

It was believed that a positive influence of the CUSP Passport would favorably impact essential team behaviors, which would then be demonstrated by overall team effectiveness and improved performance outcomes. In the early phases of data cleaning and preparation, we planned to have CUSP teams would be controlled for CUSP number of months, team size, type, and affiliate location. Including all of these covariates tended to obscure the data during analysis, so ultimately we focused on the number of CUSP months and the affiliate location.

The two aims described in this study will focus on the impact of the CUSP Passport and strength of Safety and Teamwork Domain Scores on the SCA survey, change in Safety and Teamwork Domain Scores on the SCA survey, and change in individual question scores for teamwork and safety.

The first aim of this study is to assess whether CUSP teams with better safety and teamwork domain scores in the Safety Culture Assessment in time 1 (2015) will complete more CUSP Passport challenges.[14,27]

- Hypothesis 1.1 - CUSP teams who have stronger teamwork domain scores in the 2015 Safety Culture Assessment will complete more CUSP Passport challenges than those who do not have strong SCA scores. It is believed that teams who score more favorably in the SCA on the teamwork domain, will complete more Passport challenges, while continuing to build teamwork practices and demonstrating strong teamwork skills.
- Hypothesis 1.2 – CUSP teams who have stronger safety domain scores in the 2015 Safety Culture Assessment will complete more challenges than those who do not have strong SCA scores. It is believed that teams who score more favorably in the SCA on the safety domain, will complete more Passport challenges, while continuing to build safety practices and demonstrating strong safety skills.

The second aim of this study is to compare the accomplishment of challenges on the CUSP Passport across CUSP teams at JHH and JHCP with a change in the teamwork and safety domain scores on the Safety Culture Assessment (SCA) survey from 2015 to 2017. [14,27,28]

- Hypothesis 2.1 - CUSP teams who complete more Passport challenges will show improved teamwork domain scores on the 2017 SCA compared to 2015, than those who do not complete Passport challenges.
- Hypothesis 2.2 – CUSP teams who complete more Passport challenges will show improved safety domain scores on the 2017 SCA compared to 2015, than those who do not complete Passport challenges.
- Hypothesis 2.3 - CUSP teams who complete more Passport challenges will have a higher score for an individual question in the Teamwork Domain, "People in this work setting work together as a well-coordinated team."
- Hypothesis 2.4 – CUSP teams who complete more Passport challenges will have a higher score for an individual question in the Safety Culture Domain, "I am encouraged by others in this work setting to report any patient safety concerns I may have."

CUSP Program

At Johns Hopkins Hospital, the journey for patient safety awareness took a tragic turn in 2001 when Josie King died as a result of avoidable medical error.[29] Josie King was a toddler who was treated for significant burns following injury with scalding water in a bathtub accident at home. She progressed well after her initial treatment but suffered a series of set-backs and was removed from life support leading to her death while still in the hospital. Following this event, Johns Hopkins Hospital leadership and patient safety experts began exploring options to improve patient safety and prevent harm. In 2001, the Comprehensive Unit-based Safety Program was launched in two of the Johns Hopkins' intensive care units (ICUs) to improve safety culture and learn from mistakes by integrating safety practices into the daily work of a

clinical unit.[3] CUSP is implemented at the local level, using a multidisciplinary team and training with established CUSP tools to identify defects and appropriate strategies to fix hazards. This training and use of tools is critical in the CUSP program as patient safety experts feel that culture change and patient safety improvements must involve the education of team members, the use of safety improvement tools, and measurement of improvement using data.[10]

The following are basic tenets of the CUSP Program:[3,18,30]

- Patient safety culture is local, so frontline staff are critical to the change process.
- Healthcare providers are human and always have the potential of making mistakes.
- Focus must be on system factors, so potential defects can be prevented from recurring.
- Proactive risk identification is helpful in preventing harm.
- Transparency is important in helping staff learn from each other.
- Learning from defects is supported by the use of education and the use of tools.
- Change must involve both adaptive change as well as technical improvements.
- Input from diverse team members contributes toward the success of the team.

There is evidence in the literature that CUSP has a positive impact on patient safety improvements both in terms of clinical outcomes and human resource changes.[5,17,31,32] Patient safety programs are ever so necessary when addressed in context with the estimated effect of preventable adverse events on the death rate of patients treated in our healthcare system. The published literature has shown that there is a positive association with the implementation of CUSP and the safety climate score on the culture assessment.[33] The study of this CUSP Essential Team Behaviors Passport is critical in supporting its continued use as a CUSP tool across JHM. The significance of identifying positive correlations between the Passport and the safety and teamwork domains in safety culture assessment would likely provide justification for

organizational support and funding for continued safety improvement work in the CUSP program.

The supporting infrastructure for the CUSP Program at JHM includes CUSP Facilitators at each clinical department for JHH and for JHCP overall. This role allows for communication of critical information to and from the CUSP Core Team at the organizational level. The CUSP Coordinator at the organizational level has oversight of all CUSP teams, but the inclusion of a CUSP Facilitator allows each team to be better supported by safety experts at the department level. It is possible that the CUSP Facilitator role may have influenced CUSP team success, so this confounding factor will be considered in the analysis.

Chapter 2 - Literature Review

An increasing number of articles have been published over the past years about patient safety and the effort to prevent avoidable harm, but few address the challenge of program evaluation.[8,32-36] A search of the literature using PubMed, CINAHL, Embase, and Cochrane using search terms such as "comprehensive unit based safety program" or "comprehensive unit based safety programs" revealed 77 references. While at least 23 were identified as providing value to this review and analysis, there is a significant gap in those presenting a strong program evaluation or assessment of association with teamwork or sustainability (Appendix 7).

Brilli et al. (2013) concluded that substantial reductions in safety events, preventable harm, hospital mortality, and cost were seen after implementation of CUSP.[32] With a quasi-experimental design, they used high-reliability concepts, multidisciplinary teams, and quality improvement tools to reduce hospital acquired harm. Safety climate scores were noted to improve significantly hospital-wide following CUSP implementation.

Hong et al. (2013) were able to demonstrate that CUSP was associated with a reduction in Central Line Associated Bloodstream Infections (CLABSIs).[20] The collaborative established enhanced teamwork throughout the ICUs and across the state. This was considered to contribute in part to the success of this program in Connecticut. The authors state that their results may not be generalizable to nonteaching hospitals in Connecticut.

Timmel et al. (2010) describe implementation of CUSP on a surgical inpatient unit using the process established in the ICUs, including Science of Safety training and a multidisciplinary team.[18] The team noted successful improvements in the safety and teamwork climate scores, with a significant improvement in positive perceptions of teamwork (10 percentage points).

Teamwork is a critical element of the patient experience and effective teamwork can positively influence patient safety.[38] Buzachero (2013) describes healthcare as one of the most complex organizations.[39] He further describes how important teamwork is for patient safety by identifying the team's ability to provide a care delivery experience for the patient that is coordinated and able to achieve desired quality and safety outcomes. Teamwork is defined by Salas et al. (2009) as "the means by which individual task expertise is translated, magnified, and synergistically combined to yield superior performance outcomes, the wisdom of the collectives" (p. 42).[40] The authors describe the ABCs of teamwork as the "attitudes, behaviors, and cognitions that constitute team competencies" (p. 50).[40] Team cohesion, listed within the broader ABCs of Teamwork summary, is further described as "the degree to which team members exhibit interpersonal attraction, group pride, and commitment to the task" (p. 53).[40] CUSP teams are frequently described as demonstrating group pride and commitment to the patient safety improvement effort committed to by the team.[1]

Manser (2008) published a review of research on teamwork in healthcare with a focus on quality and safety of patient care.[41] This review demonstrated the critical importance of teamwork in the dynamic healthcare environment. Manser shared the aspects of teamwork that were relevant to quality and safety of patient care including "quality of collaboration, shared mental models, coordination, communication, and leadership" (p. 148). The author's research on these teamwork attitudes indicated that healthcare practitioners don't completely appreciate the "impact of psychological factors on clinical performance and that improved teamwork may contribute to increased staff well-being as well as improved patient outcome" (p. 148).

Many publications found in additional searches using "patient safety improvement", "program improvement", and "program evaluation" were specific to interventions or technical

challenges such as decreasing central line associated blood stream infections (CLABSIs) or improving infection control practices. Since this study was specifically evaluating the CUSP Essential Team Behaviors Passport Program at JHM and the relationship with teamwork and safety climate domain scores on the SCA, the number of references that provided value were small in number.

Portela et al. (2015) offer an overview of potential methods for the study of improvement interventions.[42] The authors identify the primary characteristic of quality improvement projects as those "established primarily…as improvement activities rather than research directed towards generating new knowledge" (p. 34). This is very similar to what teams are working on in their CUSP improvement efforts, as they focus on a defined patient safety defect and work toward a specific aim. The authors state that the application of additional rigour to programs applied in practice may achieve improved outcomes. While they provide examples of the impact when this rigour is not applied, many teams are challenged in supporting their safety improvement efforts with adequate infrastructure and research design.

In the review of literature, it is clear that organizational support is necessary for CUSP and teams will likely be more successful when support is present. Organization and patient safety leaders must be involved in patient safety program implementation to ensure success and sustainability. There is an information gap as many programs have been implemented but very few program evaluations actually have been published in the area of organizational patient safety. The early literature review of CUSP teams was conducted with optimism of finding evidence of CUSP evaluation and measurement of CUSP sustainability. As very little has been published on the evaluation of CUSP and measurement of sustainability, these areas will be recommended for future research. Future research should explore whether there is a valid

definition for CUSP sustainability. Is it possible that CUSP teams who accomplish more safety improvement activities will sustain their safety work over time thus identifying a definition of sustainability?

Chapter 3 – Methods

Data Preparation

This study analyzes retrospective data from the following sources: JHM CUSP Teams active as of 10/02/2015; participation in the CUSP Passport Challenge between 2015 and 2016 JHM Patient Safety Summit; and, the JHM Safety Culture Assessment (SCA) 2015 and 2017. The analysis database created from the data described above included the following variables: 1) total CUSP teams that were active as of October 2, 2015 for each JHM affiliate location, 2) the age of the CUSP teams in months, 3) the number of CUSP Passport Challenges completed by each team between the 6th Annual JHM Patient Safety Summit in 2015 and the 7th Annual Patient Safety Summit in 2016 (Appendix 10), and 4) the work-area level SCA scores for the Patient Safety and Teamwork domains, and several individual questions from these two domains for each active CUSP team.

All CUSP teams active as of October 2, 2015 were eligible for inclusion in these analyses, since the annual JHM Patient Safety Summit was held on October 2, 2015 and this represents the launch date for the CUSP Passport. CUSP teams established after this date would not have the full year benefit to participate in the CUSP Passport challenges and were excluded from the purposes of these analyses. CUSP team age was calculated in months from the date of the CUSP team kick off to October 2, 2015, the date intended to establish inclusion and exclusion for this analysis. Participation in CUSP Passport challenges was calculated as a number count for each team that provided evidence of CUSP Passport challenge completion in JHBox between the dates of the JHM Patient Safety Summit in 2015 and 2016 (range: 0 challenges completed – 24 challenges completed). Although all JHM CUSP teams were invited to participate in the CUSP Passport, the only two JHM sites that had active engagement in the

CUSP Passport were JHH and JHCP. SCA scores were retrieved from the vendor platform used by JHM for the SCA and were indicated as a percent positive score for the Patient Safety and the Teamwork domains and the individual questions in each of these two domains (Table 2).

Table 2: CUSP Teams and SCA Participation

Affiliate	CUSP Teams 10/02/2015	CUSP Teams 12/3/2017	2015 SCA Participation All Units	Aim 1 Analysis Teams Included	2017 SCA Participation All Units	Aim 2 Analysis Teams Included
JHH	73	80	230	63	267	63
JHCP	19	45	62	18	63	18
Total	92	125	292	81	330	81

Data Cleaning and Matching

SCA data were available for five teams where data was not unique to the CUSP unit name: this situation occurred when there were smaller units that had established unique CUSP teams but were surveyed for the SCA as part of a larger work setting (see Table 3). These CUSP teams represent clinical areas such as the Weinberg OR, where a large staff is responsible for multiple specialty services and has three distinct CUSP teams (Colorectal OR, Breast Reconstruction OR, and OLHN OR) with unique patient populations and patient safety concerns. In these cases, the SCA domain and individual questions scores and response rates were reported for the larger work setting.

Table 3: CUSP Team Names with Larger Work Setting Identified

Affiliate	CUSP Teams Identified within Larger Work Setting and Shared SCA Score	Larger Work Setting Name	CUSP Teams Identified within Larger Work Setting
JHH	5	Weinberg OR	Colorectal OR Breast Reconstruction OR OLHN OR
JHH	87	Meyer 4	Meyer 4

			ECT

SCA data for several CUSP teams was captured in unique sub-groups based on the clinical setting, such as the Emergency Department (ED), where the ED Medical Staff and ED RN Staff make up the ED CUSP team. The leadership in these settings decided to separate the SCA administration into separate survey groups to capture those particular culture scores. The SCA domain scores were calculated as a weighted average domain score based on the number of respondents that completed the survey in each distinct work setting or combined respondent group (Table 4). The response rate for these teams was calculated using the total number of respondents that completed the survey for that CUSP team as the numerator, and the total number of respondents that were surveyed for all of the sub-groups as the denominator.

Table 4: CUSP Teams with SCA Calculated as a Weighted Average

Affiliate	CUSP Teams with SCA Calculation as Weighted Average	CUSP Team Combined Name	CUSP Team Sub-groups for SCA Survey
JHH	3	ED CUSP Neuro IR CUSP Wilmer CUSP	ED Medical Staff and ED RN Staff Neuro IR and Neuro IR RN Bendann Operating Room and Bendann Pre/Post
JHCP	2	Howard County CUSP Odenton CUSP	Howard County – FP and Peds Odenton – FP and IM

Final Analysis Sample

Teams were eligible for inclusion (Appendix 8) in the analyses if they were an active CUSP team as of October 2, 2015 (the date of the 2015 JHM Patient Safety Summit) and their response rate on the 2015 SCA survey was larger than or equal to 50. The number of CUSP teams who met the eligibility criteria are indicated in Table 5. There were some CUSP team

units that did not submit a 2015 SCA score or had a less than 50% response rate (see Table 6) for excluded units.

Table 5: CUSP Team Characteristics, CUSP Passport and Safety Culture Assessment

JHH and JHCP CUSP Teams	CUSP Teams (Active 12/3/2017)	Eligible CUSP Teams (Active 10/2/2015)	Eligible CUSP Teams (SCA RR ≥50%)*	Ineligible CUSP Teams (Active 10/2/2015 but SCA RR < 50%)
JHH	80	73	63 (86%)	10 (14%)
JHCP	45	19	18 (95%)	1 (5%)

*These eligible CUSP teams are included in the analyses for Aim 1.

Table 6 Excluded Units

Affiliate	Unit Name	Org ID	Reason for Exclusion
JHCP (1 unit)	Odenton OBGYN	14217	Didn't submit 2015 SCA score
JHH (10 units)	JHOC OR	12962	Response rate < 50%
	Harriet Lane Clinic	13303	
	Weinberg 5C (2015)	13084	
	Zayed 9E (SICU)	13103	
	Oncology OPD 1st Floor	13325	
	Zayed 11E	13091	
	Weinberg 4D	13081	
	Zayed 3 Neuro/OrthoSpine/Trauma OR	13095	
	Zayed 5N CSICU	13102	
	Nelson 3	13031	

The final analysis sample included 81 CUSP team units (JHH = 63, JHCP = 18) that were active as of October 2, 2015 (Table 7). These units included 29 inpatient units, 28 ambulatory settings, 8 perianesthesia units, and 5 intensive care units (ICUs) along with other settings including diagnostic/treatment, emergency, intermediate and treatment. The mean number of CUSP Passport activities completed for JHH and JHCP was 3.17 (median = 1.0, range = 0 - 24). Of the

73 JHH CUSP teams that met the definition of "active as of October 1, 2015", 63 of them had an SCA response rate of 50%, and 28 of those did not submit any CUSP Passport data. Of the 19 JHCP CUSP teams that met the definition of "active as of October 1, 2015", 18 of them had an SCA response rate of 50%, and 12 of those did not submit any CUSP Passport data. All CUSP teams who met the "active" eligibility criteria received a CUSP Passport and were included in the analyses, including the 30 teams who did not complete any CUSP Passport challenges. All of the active CUSP teams (JHH and JHCP) had access to the CUSP Passport so they met the eligibility criteria and were included in the analyses.

Table 7 Unit Characteristics and Evaluation of Selection Bias

Unit Characteristic	**Number of CUSP Teams (meeting inclusion criteria)**	**P-Value***
CUSP month		0.064
Facilitator		
Inexperienced	34	0.723
Experienced	47	
Bed Type		
Ambulatory	28	
Diagnostic/Treatment	4	
Emergency	3	
ICU	5	0.573
Inpatient	29	
Intermediate	2	
Perianesthesia	8	
Treatment	2	
Department/Specialty Type		
Ambulatory	23	
Emergency	1	
GYN OB	2	0.073
Medicine	13	
Neuro	3	
Oncology	1	
Pediatrics	12	

Perioperative	6	
Psychiatry	9	
Radiology	1	
Respiratory Therapy	1	
Surgery	9	

Co-variates and Descriptive Analyses

We intended to control for the following variables during our analyses: affiliate location, CUSP months, facilitator experience, bed type, and department. During our preliminary analysis, we determined that there were too many confounders (affiliate, CUSP months, facilitator experience, bed type, and department) to analyze the main association given the number of units eligible for inclusion. They overwhelmed the causal relationship between exposure and outcome. Our small sample size limited our statistical power, therefore, we reduced the number of control variables based on the preliminary analyses and our conceptual model. All of the methods utilized to analyze this small data set are referenced in Appendix 12. A power analysis prior to beginning this study would have added value to the study by identifying the number of units required to conduct analyses with all covariates identified as well as adding strength to the analyses.

Descriptive analyses found that the number of CUSP Passport challenges completed differed by affiliate (JHH mean = 3.60 tasks completed, JHCP mean = 1.67 tasks completed, $p = 0.0852$). The settings and organizational structure in JHH and JHCP are uniquely different. JHH is a large academic medical center with work settings across the spectrum, and predominantly acute care. JHCP includes ambulatory settings across the state of Maryland providing a comprehensive range of primary and specialty care services. Therefore, we adjusted for affiliate (JHH vs JHCP) and CUSP months (continuous) in all analyses. The correlation between the

teamwork and safety climate domain scores is highly correlated (r = 0.8082 (2015), r = 0.7986 (2017).

Table 8 Teamwork and Safety Climate Domain Scores (2015 and 2017)

Domains	Mean	Standard Deviation	Score Range
Teamwork Domain 2015	65.9	15.5	(21,94)
Safety Climate Domain 2015	68.7	14.9	(27,96)
Teamwork Domain 2017	64.1	16.0	(27,100)
Safety Climate Domain 2017	72.2	13.3	(40,100)
Teamwork Domain Score Change Between 2015 & 2017	-1.53	15.60	(-48,43)
Safety Climate Domain Score Change Between 2015 & 2017	3.70	14.70	(-28,49)

Protection of Human Subjects

Analysis of the CUSP Passport Program and the aims described in this study at Johns Hopkins School of Medicine are under the support of Institutional Review Board (IRB) study number 00142158, which is monitored by the Johns Hopkins University Provider Behavior Group (PBG). The data collected throughout JHM for the Safety Culture assessment is de-identified and can only be associated with organization and CUSP team identification, not at the respondent level. Data collected at JHM for the submission of CUSP Essential Team Behaviors Passport activity activities can only be associated with unit level identification, and data received from Pascal Metrics for the Safety Culture Assessment has only been requested at the unit level. For CUSP program administration and oversight, JHM has data elements that are tracked for each CUSP team including the names of primary CUSP team core members, the kick off date, and frequency of meetings. Data analysis has included calculation of number of years as a CUSP team, determined as effective with the kick off date. These data elements are de-identified.

Data Management and Protection

Data management mechanisms were established to ensure data protection. All data has been analyzed on work computers with password protection. No data was stored on these desktop or laptop computers or personal devices, but instead all data was stored in the Data Management for Research folder established on the JHM J drive for this purpose. Data users were asked at the beginning of data collection to confirm receipt of the notice that they were prohibited from using email messaging for data transfer and must use Johns Hopkins file sharing services instead. All participants in the study confirmed this request including the Principal Investigator for this IRB, my Dissertation Advisor, and the Biostatician providing support for *Stata* and data analyses.

Independent and Dependent Variables

Hypothesis 1.1 states that CUSP teams who have stronger teamwork domain scores in the 2015 Safety Culture Assessment will complete more CUSP Passport challenges than those who do not have strong SCA scores. The independent variables are the Time 1 Safety Culture Assessment teamwork domain scores and the dependent variables are the number of completed CUSP Passport challenges (Appendix 9). The SCA is administered every 18-24 months, and the survey administration periods are indicated in the Data Timeline (Appendix 10).

Hypothesis 1.2 states that CUSP teams who have stronger safety domain scores in the 2015 Safety Culture Assessment will complete more CUSP Passport challenges than those who do not have strong scores. The independent variables are the Safety Culture Assessment safety domain scores (Time 1), and unit type and size (controlled). The dependent variables are the number of CUSP Passport challenges completed (Appendix 9). The SCA is administered every 18-24 months, and the survey administration periods are indicated in the Data Timeline (Appendix 10).

Hypothesis 2.1 states that CUSP teams who complete more Passport challenges will show improved teamwork domain scores on the 2017 SCA compared to 2015, than those who do not complete Passport challenges. The independent variables are the CUSP Passport Essential Team Behaviors clusters. The dependent variables are the differences between the Time 2 SCA scores and the Time 1 SCA scores ($Y=T_2-T_1$).

Hypothesis 2.2 states that CUSP teams who complete more Passport challenges will show improved safety domain scores on the 2017 SCA compared to 2015, than those who do not complete Passport challenges. The independent variables are the CUSP Passport Essential Team Behavior clusters, while the dependent variables are the differences between the Time 2 SCA scores and the Time 1 SCA scores ($Y=T_2-T_1$).

Hypothesis 2.3 states that CUSP teams who complete more Passport challenges will have a higher score for an individual question in the Teamwork Domain, "People in this work setting work together as a well-coordinated team". The independent variables are the CUSP Passport Essential Team Behavior clusters, while the dependent variables are the differences between the time 2 SCA scores and the time 1 SCA scores for the individual Teamwork question (Appendix 9).

Hypothesis 2.4 states that CUSP teams who complete more Passport challenges will have a higher score for an individual question in the Safety Culture Domain, "I am encouraged by others in this work setting to report any patient safety concerns I may have". The independent variables are the CUSP Passport Essential Team Behavior clusters, while the dependent variables are the difference between the time 2 SCA scores and the time 1 SCA scores for the individual Safety Culture question (Appendix 9).

Study Design and Duration

Data collection for the study began March 9, 2015, lasting through July 30, 2017. Observations included the Safety Culture Assessment for Time 1 and Time 2, focusing on the safety and teamwork domain scores pre- and post- implementation of CUSP Essential Team Behaviors Passport and several individual questions selected from the teamwork and safety culture domains. The study intervention was the rollout of the CUSP Essential Team Behaviors Passport implemented in November 2015 for all active CUSP teams as of the time of the JHM Patient Safety Summit (Appendix 10).

Study Population and Setting

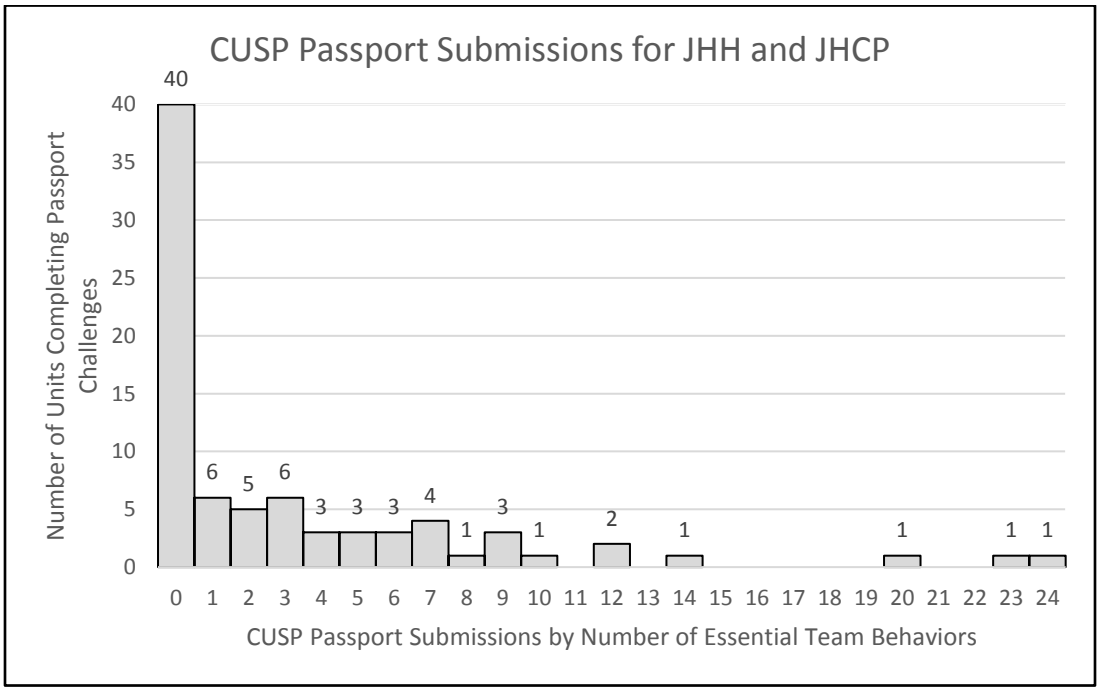
The study population includes the CUSP teams across the Johns Hopkins Hospital (JHH), East Baltimore Campus, as well as the Johns Hopkins Community Physicians (JHCP), Maryland, that met the inclusion criteria as of the 6th Annual JHM Patient Safety Summit in November 2015 (Appendix 8). The CUSP Program has been rolled out and supported throughout JHM, although the number of CUSP teams varies at each location. The Johns Hopkins Medical Institutions have campuses across Maryland and Florida including Johns Hopkins Bayview Medical Center, Howard County General Hospital, Sibley Memorial Hospital, Suburban Hospital, and Johns Hopkins All Children's Hospital in Florida. None of the other campuses participated in the CUSP Passport by uploading evidence of their safety work in the platform. Inclusion criteria for analysis include CUSP teams that were active as of October 2, 2015, inclusion in the Safety Culture Assessment 2015 with at least a 50% response rate, inclusion in the Safety Culture Assessment 2017 with at least a 50% response rate, and completion of CUSP Passport challenges during the study period (Appendix 8, 10).

Chapter 4: Results

Aim 1 Results

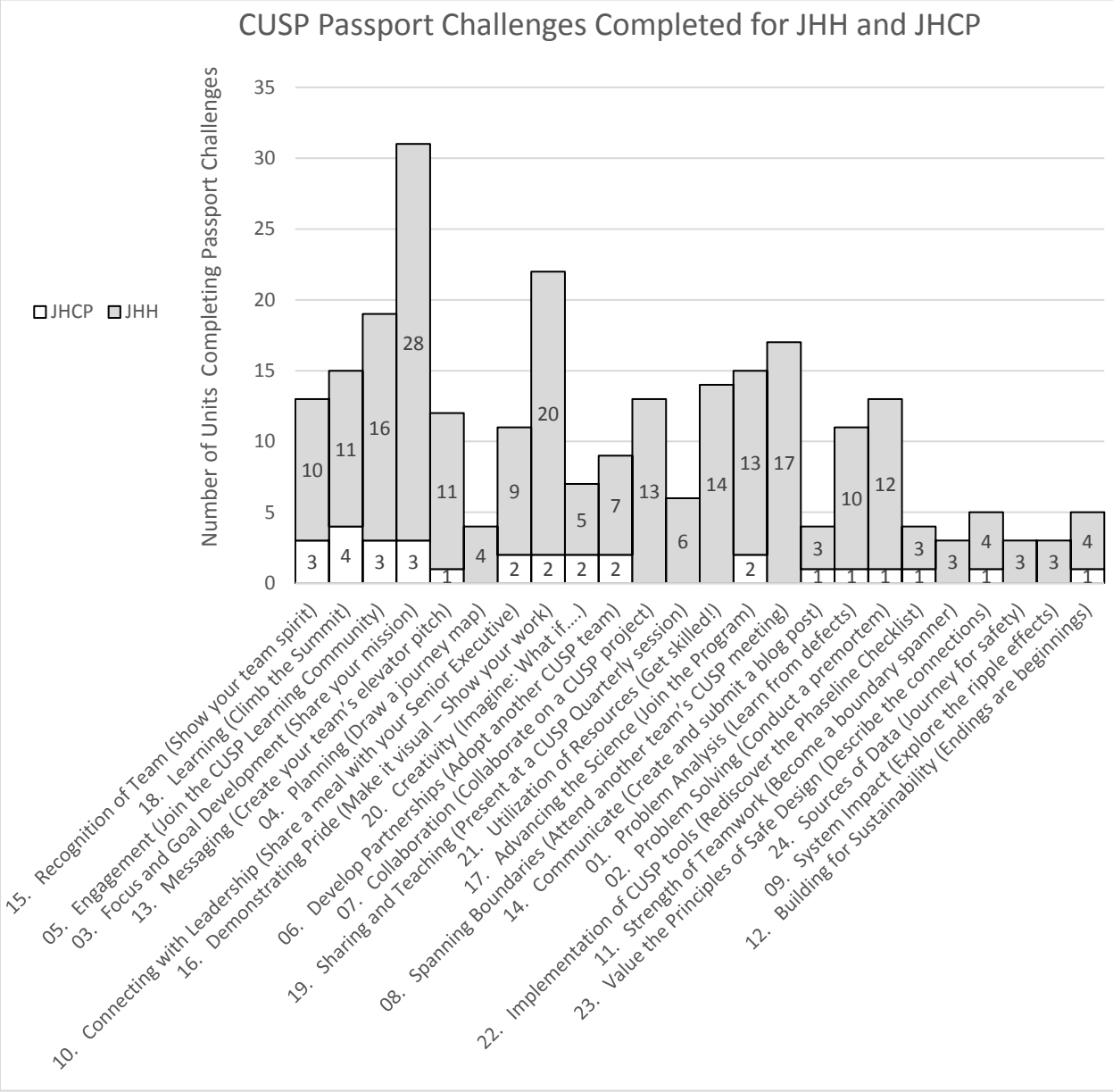
Using the Negative Binomial Regression Model for the Aim 1 data (see Figure 1), we found significance in the results for Hypothesis 1.1 (Table 9). CUSP teams who have stronger teamwork domain scores in the 2015 Safety Culture Assessment will complete more CUSP Passport challenges than those who do not have strong SCA scores (IRR=1.03, 95% CI: 1.005, 1.057, p=0.021). For each unit increase of time 1 SCA teamwork domain score, the total number of CUSP Passport tasks completed had a 3% increase. Using Negative Binomial Regression for Hypothesis 1.2, there was no association between the safety culture domain score and the number of CUSP Passport challenges completed (IRR=1.02, 95% CI: 0.998, 1.050, p=0.068).

Figure 1



The distribution of the total number of CUSP Passport challenges completed indicates a difference between the mean of 3.17 and the variance of 26.09.

Figure 2



This figure shows the order of CUSP Passport challenges as they appear in the originally distributed CUSP Passport. The frequency count of CUSP Passport challenges completed totals 259, with 63% of CUSP Passport challenges completed occurring in the first 12 challenges listed in the CUSP Passport, and 36% of CUSP Passport challenges completed occurring in the second 12 challenges listed in the CUSP Passport. This

frequency may indicate a preference of teams to complete CUSP Passport challenges sequentially throughout the year. Another reason for this distribution of CUSP Passport challenges throughout the year, may indicate a preference of CUSP teams to complete less complex challenges which appear more frequently in the first half of the CUSP Passport. Examples of some of the most frequent CUSP challenges completed by teams in the first half of the CUSP Passport include "Share your mission" with 31 CUSP teams completing this challenge, and "Make it visual – Show your work" with 22 teams completing this challenge.

Table 9 Aim 1 Results

Relationship Between Time 1 SCA scores and the Number of Completed CUSP Passport Tasks*			
Model Terms	**IRR**	**95% CI**	**P-value**
Teamwork Domain	1.03	(1.005-1.057)	0.021
JHCP	Reference	Reference	0.208
JHH	1.89	(0.703-5.058)	
CUSP team age (in month)	1.00	(0.994-1.008)	0.813
Safety Culture Domain	1.02	(0.998-1.050)	0.068
JHCP	Reference	Reference	0.120
JHH	2.17	(0.816-5.778)	
CUSP team age (in month)	1.00	(0.994-1.009)	0.724

*Results from negative binominal regression model.

Aim 2 Results

Using the Multiple Linear Regression Model, the data for each of the four hypotheses in Aim 2 was analyzed and there was no association found between the number of CUSP Passport challenges completed and the difference in teamwork domain score from time 1 to time 2 or the difference in safety culture domain score from time 1 to time 2 (see Table 9). There was also no association found for the difference in the individual teamwork domain question "People in this work setting work together as a well-coordinated team", or the individual safety domain question

"I am encouraged by others in this work setting to report any patient safety concerns I may have" (Table 10).

Table 10 Aim 2 Results

Model Terms	Teamwork Domain Score Change Between Time 1 & Time 2			Safety Climate Domain Score Change Between Time 1 & Time 2		
	Coefficient	**95% CI**	**P-value**	**Coefficient**	**95% CI**	**P-value**
Total	0.17	(-0.311, 0.652)	0.483	0.21	(-0.374, 0.789)	0.479
JHCP	Reference	Reference	0.335	Reference	Reference	0.037
JHH	-4.93	(-15.051, 5.190)		-8.92	(-17.297, -0.545)	
CUSP team age**	0.01	(-0.048, 0.069)	0.720	0.01	(-0.049, 0.068)	0.752
2015 SCA score	-0.49	(-0.695, -0.281)	0.000	-0.64	(-0.815, -0.457)	0.000
Analysis	1.61	(-1.233, 4.455)	0.263	2.04	(-0.661, 4.736)	0.137
JHCP	Reference	Reference	0.282	Reference	Reference	0.024
JHH	-5.57	(-15.800, 4.669)		-9.79	(-18.253, -1.325)	
CUSP team age	0.01	(-0.046, 0.070)	0.683	0.01	(-0.048, 0.069)	0.729
2015 SCA score	-0.51	(-0.719, -0.292)	0.000	-0.65	(-0.829, -0.474)	0.000
Collaboration	1.16	(-0.102, 2.425)	0.071	0.92	(-0.589, 2.429)	0.228
JHCP	Reference	Reference	0.294	Reference	Reference	0.033
JHH	-5.42	(-15.651, 4.801)		-9.21	(-17.644, -0.784)	
CUSP team age	0.01	(-0.047, 0.070)	0.697	0.01	(-0.048, 0.069)	0.729
2015 SCA score	-0.50	(-0.708, -0.300)	0.000	-0.64	(-0.816, -0.466)	0.000
Communication	0.28	(-2.312, 2.871)	0.830	0.59	(-2.218, 3.407)	0.675
JHCP	Reference	Reference	0.353	Reference	Reference	0.041
JHH	-4.72	(-14.765, 5.330)		-8.69	(-17.005, -0.383)	
CUSP team age	0.01	(-0.048, 0.070)	0.712	0.01	(-0.049, 0.069)	0.744
2015 SCA score	-0.48	(-0.685, -0.272)	0.000	-0.63	(-0.810, -0.451)	0.000
Education	-1.34	(-4.310, 1.625)	0.370	-0.77	(-3.821, 2.280)	0.616
JHCP	Reference	Reference	0.356	Reference	Reference	0.042
JHH	-4.64	(-14.600, 5.311)		-8.50	(-16.671, -0.326)	
CUSP team age	0.01	(-0.046, 0.073)	0.651	0.01	(-0.046, 0.072)	0.670
2015 SCA score	-0.50	(-0.654, -0.264)	0.000	-0.61	(-0.788, -0.439)	0.000
Resources	0.61	(-2.063, 3.288)	0.650	1.09	(-3.014, 5.184)	0.600
JHCP	Reference	Reference	0.349	Reference	Reference	0.038
JHH	-4.75	(-14.794, 5.288)		-8.73	(-16.947, -0.516)	
CUSP team age	0.01	(-0.050, 0.070)	0.739	0.01	(-0.053, 0.069)	0.790
2015 SCA score	-0.48	(-0.678, -0.282)	0.000	-0.63	(-0.803, -0.456)	0.000

* Results from Multiple Linear regression model
** CUSP team age is calculated in months

Table 11 Aim 2 Results (Hypothesis 2.3)*

Model Terms	Coefficient	95% CI	P-value
Total	0.26	(-0.050, 0.568)	0.099
JHCP	Reference	Reference	0.474
JHH	-3.20	(-12.051, 5.651)	
CUSP team age	0.02	(-0.022, 0.068)	0.315
2015 SCA score	-0.47	(-0.675, -0.279)	0.000

* Score Change for question "People in this work setting work together as a well-coordinated team" Between Time 1 & Time 2

Table 12 Aim 2 Results (Hypothesis 2.4)*

Model Terms	Coefficient	95% CI	P-value
Total	0.04	(-0.321, 0.397)	0.834
JHCP	Reference	Reference	0.298
JHH	-2.29	(-6.633, 2.060)	
CUSP team age	0.01	(-0.027, 0.045)	0.617
2015 SCA score	-0.70	(-0.845, -0.552)	0.000

* Score Change for question “I am encouraged by others in this work setting to report any patient safety concerns I may have” Between Time 1 & Time 2

Chapter 5: Discussion of Results

Discussion

This analysis was conducted to examine the relationship between the CUSP Passport challenge and safety culture, using the SCA teamwork and safety climate domain scores, a specific teamwork domain question, "People in this work setting work together as a well-coordinated team", and a specific safety culture domain question, "I am encouraged by others in this work setting to report and patient safety concerns I may have."

Key Findings

Hypothesis 1.1 states that CUSP teams who have stronger teamwork domain scores in the 2015 Safety Culture Assessment will complete more CUSP Passport challenges than those who do not have strong SCA scores. When the Standard Negative Binomial Regression model was applied and adjusted for affiliate and number of CUSP months, an IRR of 1.03 was calculated with a p value of 0.021, showing significance. For each unit increase of time 1 SCA teamwork domain score, the total number of CUSP Passport tasks completed will increase by 3% ($p = 0.021$).

Hypothesis 1.2 states that CUSP teams with stronger safety climate domain scores in the 2015 Safety Culture Assessment will complete more CUSP Passport challenges than those who do not have strong SCA scores. When the Standard Negative Binomial Regression model was applied and adjusted for affiliate and number of CUSP months, an IRR of 1.02 was calculated with a p value of 0.068, showing no significance.

The Aim 2 hypotheses compared the accomplishment of challenges on the CUSP Passport across CUSP teams at JHH and JHCP with a change in the teamwork and safety climate domain scores on the SCA from 2015 to 2017. The results from the Multiple Linear Regression

model showed no significance. It is difficult to draw conclusions from these results given the small sample size. Although an increase of time 1 SCA teamwork domain score may increase the total number of CUSP Passport tasks completed by 30 percent (hypothesis 1.1 results – Table 8), there are no significant results noted in hypothesis 2.1, stating that CUSP teams who complete more Passport challenges will show improved teamwork domain scores on the 2017 SCA compared to 2015, than those who do not complete Passport challenges.

There is some difficulty in determining whether these findings are consistent with other studies, given little evidence of this work in the published literature. Conducting a search in PubMed for patient safety program evaluations and safety projects revealed 226 publications, however only two provided relevant context for comparison. Carter and Price (2016) published a two-part paper offering guidance on how to bring about evidence-based change in practice, but this does not connect the safety improvement work with safety culture assessment, and specifically teamwork domain scores.[43] Portela et.al. (2015) describe the principles and strengths of study designs and their work does not connect safety improvement with safety culture assessment.[42]

Limitations

Although at the time of this writing, there are over 170 existing CUSP teams at JHM, only 146 teams were active by the 2015 date indicated in the inclusion criteria (Appendix 1), and of those, only two affiliate sites (JHH and JHCP) participated in the CUSP Passport challenge. The 92 active CUSP teams from these two sites were included in our initial database, but we had to exclude 11 teams that did not reach the minimum response rate of 50 percent for the 2017 SCA. This presented a significant challenge to the analysis, as only 88 percent of the 92 CUSP teams active as of November 1, 2015, met the eligibility criteria for inclusion in the Aim 1

analysis. The CUSP Passport challenge was implemented as an entirely voluntary program, with a duration plan intended between the dates of the two JHM Patient Safety Summits in 2015 and 2016 (Appendix 10).

Several program elements that would provide strength were clearly lacking, yet not identified until data analysis started. When the CUSP Passport program was established, engagement was voluntary just as the CUSP Program remains. Although all CUSP teams received details of the Passport Program via stage announcements at the JHM Summit and the regular established communication process for CUSP teams, only two affiliates participated, and of those affiliate CUSP teams, only 81 met the inclusion criteria. Either participation in the CUSP Passport program may have been more clearly encouraged, or the communication about the benefits of learning from the study may have been better articulated. Second, in the program structure for the CUSP Passport there were a limited number of program incentives to encourage involvement. Although participants were encouraged to consider patient safety program consultation rewards such as time with a CUSP Expert, a Human Factors Engineer, or an Organizational Psychologist, once the program was established at the JHM Summit in 2015, additional incentives were added. Lack of dedicated time to accomplish patient safety improvement work, may have prevented even the most interested team from full participation. In fact, future analysis may provide insight into the level of program success with examination of the qualitative perspective, using focus groups and interviews to determine what provided support for team participation and what may have presented barriers from participating.

The CUSP Passport program winner was defined as the CUSP team that participated in the CUSP Passport challenge and gathered the most Passport challenges before the time of the 2016 JHM Summit. Ultimately, the winning CUSP team was offered travel for two CUSP team

members to travel to Queen's Medical Center (QMC) in Hawaii, to present their engagement in the CUSP Passport program and share their experience with other CUSP teams at QMC. This incentive may have been able to be shared more broadly had it been included with program details at the 2015 Summit.

The CUSP Passport project plan did not include dedicated time for data management or quality checks. In fact, this work was not initially established as a thesis and elements of project management that may have provided strength in measurement or analysis were not included. These elements have been described in prior sections and include a description of the plan to measure success, a larger number of CUSP teams that would have provided strength in analysis, and oversight of the data management and collection.

Implications for Operations/Program Development

This work has implications for program development. CUSP core team members and unit members that participated in the CUSP Passport provided anecdotal evidence that the program was of interest. There was significance in the analysis to indicate that teams who score more favorably in the teamwork domain would complete more Passport challenges. Some of these challenges demonstrate improved communication and teamwork across unit boundaries, an area that would benefit from additional attention. Improved communication and data management may contribute to future renditions of this program on a broader scale, inclusive of all active CUSP teams. Lessons learned from this work provide insight however with elements that could strengthen the CUSP Passport 2.0. Implications for operations include the development of programs and tools that may successfully influence team behaviors and improve teamwork across units, a traditionally low scoring domain in the safety culture assessment.

Implications of the Process of Implementation

A number of factors related to the process of implementing the CUSP Essential Team Behaviors Passport amidst competing priorities play a key role in the extent of adoption, sustainability, and eventual impact of such an intervention. CUSP teams, already challenged in carrying out patient safety improvement work during what is often recorded as "non-productive time", may not be able to carve out additional time for a CUSP Passport challenge. The CUSP Passport challenges in their original form were likely considered non-essential. The learning gained by completion of the CUSP Passport challenges was likely perceived as possible through other learning avenues as well, such as simply reaching out to the experts that were offered as consult options in the incentive package. It is possible that there was not the anticipated impact on the 2017 SCA scores because the Passport was incompletely or insufficiently implemented. Diminished implementation fidelity may be why fewer CUSP Passport challenges were completed by some CUSP teams compared to others.

Implications for Literature

This study demonstrates that there is a significant relationship between the teamwork domain score in the SCA and the completion of CUSP Passport challenges. We can see the link between team behaviors and the teamwork domain in our safety culture assessment. The CUSP program has been active in the United States since 2001 and internationally in Saudi Arabia, the UAE, Nigeria, Uganda, and Brazil since the first teams were active in 2008. The literature includes some evidence of the correlation between CUSP and improved clinical outcomes and safety culture. There is little published on the evaluation of the program elements and program sustainability. This study and similar work can fill this gap in the literature.

Implications for Policy

The results of this study have implications for current and future policy. CUSP has been implemented throughout the United States and internationally including Saudi Arabia, the United Arab Emirates, Brazil, Nigeria and Uganda. Implications for current policy include the opportunities existing teams may have to effect an improvement in a safety program such as the CUSP Passport by focusing implementation on teams who have identified stronger teamwork domain scores. The significant relationship between teamwork culture scores and the accomplishment of CUSP Passport challenges may be a factor in safety leadership decision-making about program support and financial planning. In addition, the Agency for Healthcare Research and Quality (AHRQ) supports the CUSP program via its website and professional materials. This may be an opportunity for AHRQ to add the relationship of teamwork culture scores and the accomplishments of the CUSP Passport, or a similar type of patient safety improvement program.

Generalizability of Results

The results of this study are not widely generalizable to other organizations, healthcare systems, or settings (Appendix 11). The study was planned to evaluate the CUSP Passport, a program that was designed to encourage team behaviors with hopes showing a relationship between overall team effectiveness and improved performance outcomes. External validity is considered a threat given that the study is focused in one academic center including an ambulatory affiliate site, there is no control group, and the participation was limited by such small participation.

Program Elements Potentially Improving Program Success

The following program elements, if strengthened, may have improved the likelihood of the CUSP Passport program success and analysis with significant results: involvement of all JHM

affiliates for a larger participation of individual CUSP teams; delineation of all program incentives at the start of the program; establishing strong communication routes for all CUSP teams within and across affiliates; and, communicating the intent to evaluate the program in advance. Involvement of all JHM affiliates may have simply required regular communication and reporting of CUSP Passport participation. Affiliates are located broadly across Maryland, the District of Columbia, and Florida, and rely on established lines of communication throughout key roles in the CUSP model for program updates and training. The analysis of the program may have benefited from a larger base number of teams participating and the program structure did not collect reasons for participation or lack of participation. Secondly, while staggering the program incentives worked for a number of competitive CUSP teams, there were likely some teams that never recognized the expanding incentive options that later included a trip to one of the JHM contracted sites in Hawaii. Third, the importance of the CUSP model with delineated key roles and responsibilities, is significant to sharing the communication about the tenets of CUSP, training and program updates for each affiliate and all existing CUSP teams. It is quite possible, that some CUSP Facilitators represented the program elements differently than others, or shared program information more directly in support of CUSP team involvement. And finally, the program evaluation was not determined up front. We did not establish the CUSP Passport with a pre-determination of using the SCA in a possible relationship with the number of CUSP Passport challenges completed. In fact, we initially set up the program to track simply the total number of CUSP Passport challenges completed by each team. The scheduled communication of these results was managed operationally as a message out to the CUSP teams through their CUSP Facilitators, a team that meets monthly.

Recommendations for Future Research

Future studies may consider several structural components to improve the potential of finding significant correlations and the application of results. CUSP Passport 2.0 may include the following improvements to meet these objectives: broad participation across active CUSP teams at JHM; establishing a program metric of comparing completion of CUSP Passport challenges to the SCA scores in the domains of safety culture and teamwork; clearly delineating program incentives with possible levels such as consultation, tool support and opportunity to share the team's program success; and, establishing clear and regular communications that control for the positioning of CUSP teams across the organization and the variance in communication and support from the CUSP model at JHM.

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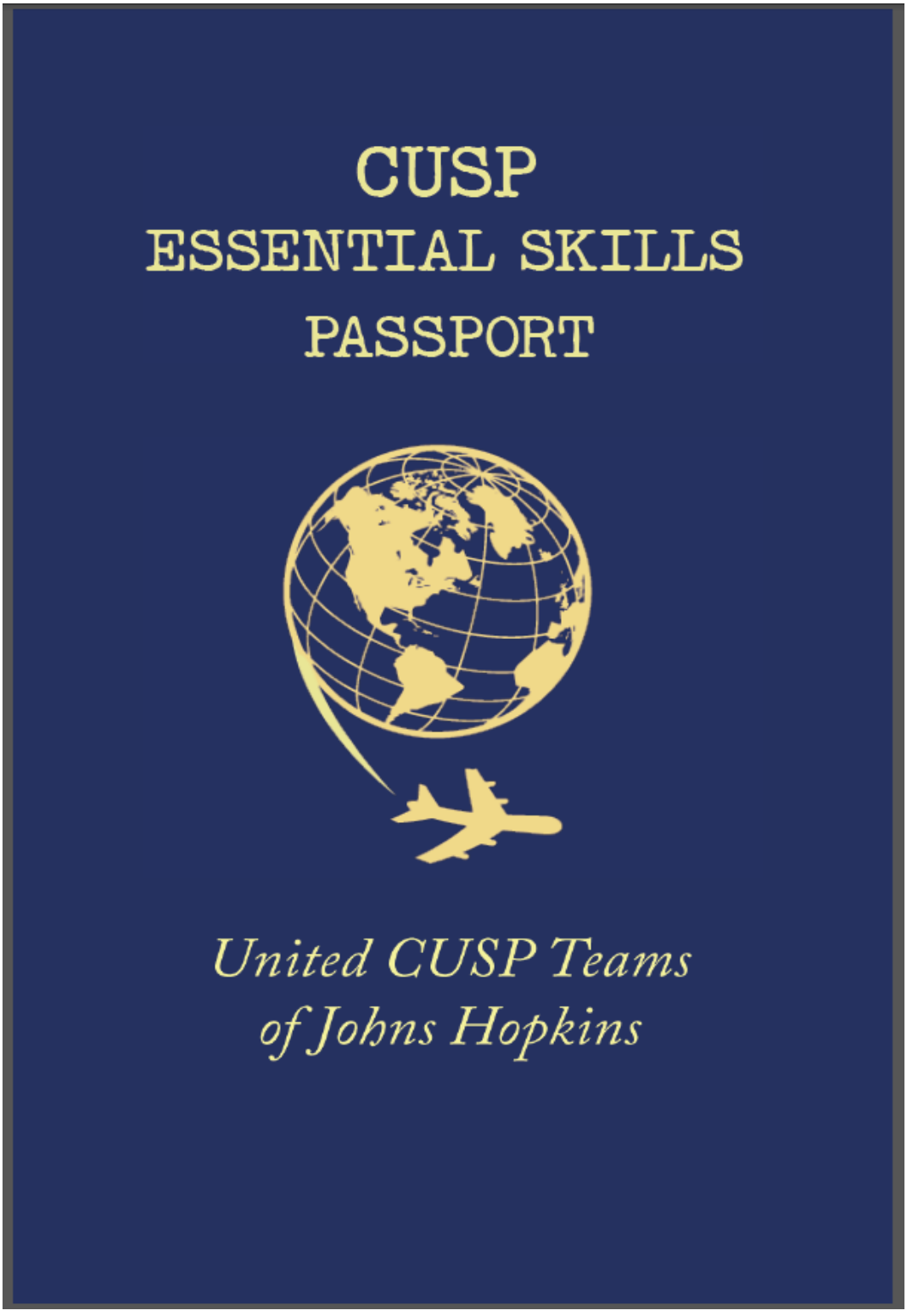
Appendix 1

Johns Hopkins Medicine CUSP Teams		
JHM Site	**Number of CUSP Teams** (October 2, 2015)	**Number of CUSP Teams with Passport Participation** (October 14, 2016)
Howard County General Hospital	7	0
Johns Hopkins All Children's Hospital	2	0
Johns Hopkins Bayview Medical Center	15	0
Johns Hopkins Community Physicians (JHCP)	19	9
Johns Hopkins Hospital (JHH)	73	38
Sibley Memorial Hospital (Sibley)	29	0
Suburban Hospital	1	0

Appendix 2 CUSP Essential Team Behaviors Passport



Appendix 3 CUSP Passport Essential Team Behaviors

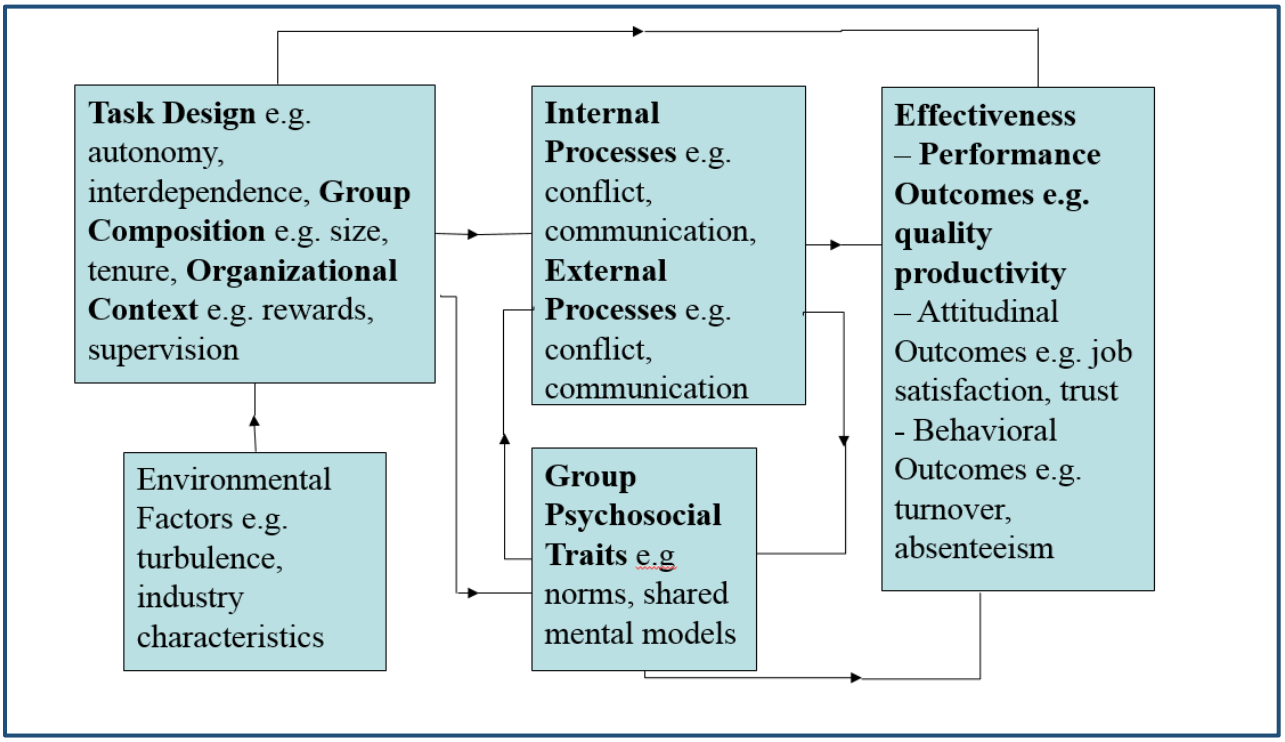
Essential Team Behaviors	**Theme**
1. Problem Analysis (Learn from defects)	Analysis & Process
2. Problem Solving (Conduct a premortem)	Analysis & Process
3. Focus and Goal Development (Share your mission)	Analysis & Process
4. Planning (Draw a journey map)	Analysis & Process
5. Engagement (Join the CUSP Learning Community)	Collaboration
6. Develop Partnerships (Adopt another CUSP team)	Collaboration
7. Collaboration (Collaborate on a CUSP project)	Collaboration
8. Spanning Boundaries (Attend another team's CUSP meeting)	Collaboration
9. System Impact (Explore the ripple effects)	Collaboration
10. Connecting with Leadership (Share a meal with your Senior Executive)	Collaboration
11. Strength of Teamwork (Become a boundary spanner)	Collaboration
12. Building for Sustainability (Endings are beginnings)	Collaboration
13. Messaging (Create your team's elevator pitch)	Communication & Recognition
14. Communicate (Create and submit a blog post)	Communication & Recognition
15. Recognition of Team (Show your team spirit)	Communication & Recognition
16. Demonstrating Pride (Make it visual – Show your work)	Communication & Recognition
17. Advancing the Science (Join the Program)	Education & Innovation
18. Learning (Climb the Summit)	Education & Innovation
19. Sharing and Teaching (Present at a CUSP Quarterly session)	Education & Innovation
20. Creativity (Imagine: What if….)	Education & Innovation
21. Utilization of Resources (Get skilled!)	Utilizing Resources
22. Implementation of CUSP tools (Rediscover the Phaseline Checklist)	Utilizing Resources
23. Value the Principles of Safe Design (Describe the connections)	Utilizing Resources
24. Sources of Data (Journey for safety)	Utilizing Resources

Appendix 4 Pascal Metrics SCA Survey Questions

SCA Acute Care Setting 2017 - Safety Climate Domain Questions	
	I would feel safe being treated here as a patient.
	Medical errors are handled appropriately in this work setting.
	I know the proper channels to direct questions regarding patient safety in this work setting.
	I receive appropriate feedback about my performance.
	In this work setting, it is difficult to discuss errors.
	I am encouraged by others in this work setting to report any patient safety concerns I may have.
	The culture in this work setting makes it easy to learn from the errors of others.
SCA Acute Care Setting 2017 - Teamwork Domain Questions	
	My input is well received in this work setting.
	In this work setting, it is difficult to speak up if I perceive a problem with patient care.
	Disagreements in this work setting are resolved appropriately (i.e., not who is right, but what is best for the patient).
	I have the support I need from others in this work setting to care for patients.
	It is easy for personnel here to ask questions when there is something that they do not understand.
	People in this work setting work together as a well-coordinated team.

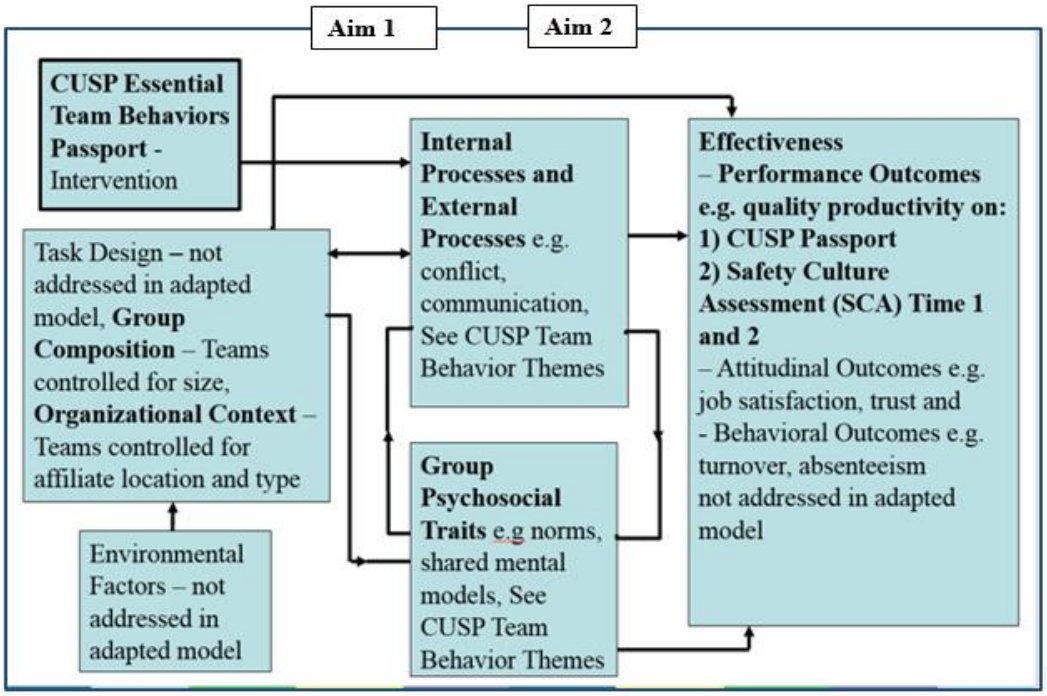
Pascal Metrics (2017). Safety Culture Assessment Data for Johns Hopkins Medicine

Appendix 5 Theoretical Framework of Team Effectiveness



Adapted from Cohen & Bailey, 1997

Appendix 6 Conceptual Model of CUSP Team Effectiveness



Adapted from Cohen & Bailey, 1997

Appendix 7 Literature Review

Year	Title	Authors	Objective/Abstract
2013	Decreasing Central-Line-Associated Bloodstream Infections in Connecticut Intensive Care Units	Hong, A.L., Sawyer, M.D., Shore, A., Winters, B.D., Masuga, M., Lee, HW., Mathews, S., Weeks, K., Goeschel, C.A., Berenholtz, S.M., Pronovost, P.J., & Lubomski, L.H.	Determine whether the multifaceted intervention from the Michigan Keystone program could be implemented in Connecticut and to evaluate the impact on CLABSI rates in intensive care units (ICUs)
2010	Impact of the Comprehensive Unit-based Safety Program (CUSP) on Safety Culture in a Surgical Inpatient Unit	Timmel, J., Kent, P.S., Holzmueller, C.G., Paine, L., Schulick, R.D., & Pronovost, P.J.	Reports an evaluation of the impact of CUSP (1) on safety climate, which describes staff perceptions of the safety norms and behaviors in the workplace, and (2) on teamwork climate in an adult surgical oncology unit, as well as on staff's ability to learn from medical errors
2008	Improving patient safety in intensive care units in Michigan	Pronovost, P.J., Berenholtz, S.M., Goeschel, C., Thom, I., Watson, S.R., Holzmueller, C.G., Lyon, J.S., Lubomski, L.H., Thompson, D.A., Needham, D., Hyzy, R., Welsh, R., Roth, G., Bander, J., Morlock, L. & Sexton, J.B.	Describe the design and lessons learned from implementing a large-scale patient safety collaborative and the impact of an intervention on teamwork climate in intensive care units (ICUs) across the state of Michigan
2016	Influence of the Comprehensive Unit-based Safety Program in ICUs: Evidence From the Keystone ICU Project	Hsu, Y-J. & Marsteller, J.A.	Test the effectiveness of a safety and teamwork culture improvement program, known as the Comprehensive Unit-based Safety Program (CUSP), in improving staff perceptions of safety, barriers to progress in implementing the intervention, and patient outcomes
2011	Assessing and improving safety climate in a large cohort of intensive care units	Sexton, J.B., Berenholtz, S.M., Goeschel, C.A., Watson, S.R., Holzmueller, C.G., Thompson, D.A., Hyzy, R.C., Marsteller, J.A., Schumacher, K. & Pronovost, P.J.	Evaluate the impact of a comprehensive unit-based safety program on safety climate in a large cohort of intensive care units participating in the Keystone intensive care unit project
2005	Implementing and Validating a Comprehensive Unit-Based Safety Program	Pronovost, P.J., Weast, B., Rosenstein, B., Sexton, J.B., Holzmueller, C.G., Paine, L., Davis, R., & Rubin, H.R.	Describes the implementation and validation of a comprehensive unit-based safety program (CUSP) in intensive care settings
Year	Title	Authors	Objective/Abstract

2014	Improving Safety and Quality With Enhanced Teamwork Through Operating Room Briefings	Hicks, C.W., Rosen, M, Hobson, D.B., Ko, C. & Wick, E.C.	To describe the current state of the science for operating room (OR) briefings and debriefings, including an overview of key definitions, a review of the evidence of effectiveness, and a summary of our experiences as part of a comprehensive unit-based safety program
2006	Measuring safety climate in health care	Flin, R., Burns, C., Mearns, K., Yle, S. & Robertson, E.M.	To review quantitative studies of safety climate in health care to examine the psychometric properties of the questionnaires designed to measure this construct
2015	The Effect of Implementing a Comprehensive Unit-Based Safety Program on Urinary Catheter Use	Underwood, L.	To evaluate the effect of a targeted intervention to decrease catheter-associated urinary tract infections (CAUTIs) and urinary catheter utilization by implementing quality improvement initiatives
2016	Using the Comprehensive Unit-based Safety Program model for sustained reduction in hospital infections	Miller, K., Casey, D., Mitchell, D., Ritter, C. & Wakai, S.	To report the significant impact that the Comprehensive Unit-based Safety Program (CUSP) had in reducing CLABSI and catheter-associated urinary tract infections (CAUTIs) and ventilator-associated pneumonia (VAP) in 2 intensive care units (ICUs)
2016	Targeted implementation of the Comprehensive Unit-Based Safety Program through an assessment of safety culture to minimize central line-associated bloodstream infections	Richter, J.P. & McAlearney, A.S.	To identify the significant factors of safety culture prior to CUSP implementation associated with a reduction or elimination of CLABSIs
2012	A multicenter, phased, cluster-randomized controlled trial to reduce central line-associated bloodstream infections in intensive care units	Marsteller, J.A., Sexton, J.B., Hsu, Y-J., Hsiao, C-J., Holzmueller, C.G., Pronovost, P.J. & Thompson, D.A.	To determine the causal effects of an intervention proven effective in pre-post studies in reducing central line-associated bloodstream infections in the intensive care unit
Year	Title	Authors	Objective/Abstract

2013	A Comprehensive Patient Safety Program Can Significantly Reduce Preventable Harm, Associated Costs, and Hospital Mortality	Brilli, R.J., McClead, R.E., Crandall, W.V., Stoverock, L., Berry, J.C., Wheeler, T.A. & Davis, J.T.	To evaluate the effectiveness of a hospital-wide initiative to improve patient safety by implementing high-reliability practices as part of a quality improvement (QI) program aimed at reducing all preventable harm
2012	A Comprehensive Unit-Based Safety Program (CUSP) in Surgery: Improving Quality Through Transparency	Cooper, M. & Makary, M.A.	To review the science for the Comprehensive Unit-based Safety Program (CUSP) and the evidence of never events, wrong site surgeries and safety culture
2016	Comprehensive Unit-based Safety Program (CUSP) to Improve Patient Experience: How a Hospital Enhanced Care Transitions and Discharge Process	Pottenger, B.C., Davis, R.O., Miller, J., Allen, L., Sawyer, M. & Pronovost, P.J.	To determine whether the Comprehensive Unit-based Safety Program (CUSP) teams could be used to enhance patient experience by improving care transitions and discharge processes
2008	Sentinel Event Alert: Behaviors that undermine a culture of safety	The Joint Commission	To review behaviors that undermine a culture of safety such as intimidating and disruptive behaviors
2011	Safety culture in healthcare: a review of concepts, dimensions, measures and progress	Halligan, M. & Zecevic, A.	To report a literature review including definitions of safety culture and safety climate, identifying theories, dimensions and measures of safety culture in healthcare, and review progress in improving safety culture
2010	Integrating CUSP and TRIP to Improve Patient Safety	Romig, M., Goeschel, C., Pronovost, P. & Berenholtz, S.M.	To describe two models for improving health care delivery that were successfully used in the Michigan Keystone Project to eliminate catheter-related bloodstream infections
2015	A Collaborative Learning Network Approach to Improvement: The CUSP Learning Network	Weaver, S.J., Lofthus, J., Sawyer, M., Greer, L., Opett, K., Reynolds, C., Wyskiel, R., Peditto, S. & Pronovost, P.J.	To describe common themes across case studies suggesting that members find value in collaborative learning and sharing strategies across organizational boundaries related to the Comprehensive Unit-based Safety Program (CUSP)
Year	Title	Authors	Objective/Abstract

2012	Eradicating Central Line-Associated Bloodstream Infections Statewide: The Hawaii Experience	Lin, D.M., Weeks, K., Bauer, L., Combes, J.R., George, C.T., Goeschel, C.A., Lubomski, L.H., Mathews, S.C., Sawyer, M.D., Thompson, D.A., Watson, S.R., Winters, B.D., Marsteller, J.A., Berenholtz, S.M., Pronovost, P.J. & Pham, J.C.	To determine if a national intensive care unit (ICU) collaborative to reduce central line-associated bloodstream infections (CLABSIs) would succeed in Hawaii
2014	Evaluating the impact of mandatory public reporting on participation and performance in a program to reduce central line-associated bloodstream infections: Evidence from a national patient safety collaborative	Marsteller, J.A., Hsu, Y-J. & Weeks, K.	Examines whether mandatory reporting impacted participation and performance in reducing central line-associated bloodstream infections (CLABSIs) in a national patient safety collaborative
2010	What Have We Learned About Interventions to Reduce Medical Errors?	Woodward, H.I., Mytton, O.T., Lemer, C., Yardley, I.E., Ellis, B.M., Rutter, P.D., Greaves, F.E.C., Noble, D.J., Kelley, E. & Wu, A.W.	Provides a broad perspective review on major effective, established, or promising strategies to reduce medical errors and harm
2014	Application of a Comprehensive Unit-Based Safety Program in Critical Care: The Royal Exchange	Smith, L.E. & Flanders, S.A.	To describe the application of CUSP in critical care at the Royal Exchange including the improvement of patient safety at the unit level and reduction of health care-associated infections

Appendix 8 Inclusion and Exclusion Criteria for Analysis

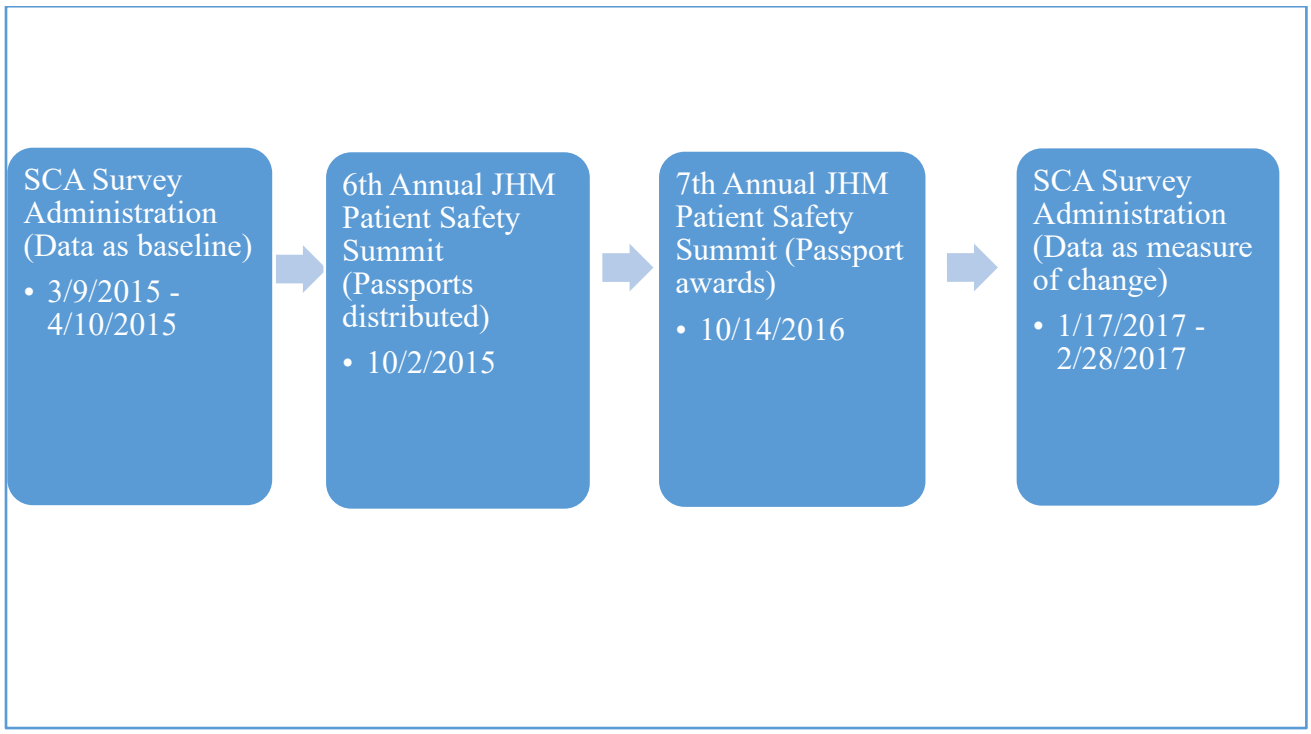
Aims	Inclusion Criteria	Exclusion Criteria
Aim 1: To assess whether CUSP teams with better safety and teamwork domain scores in the Safety Culture Assessment (SCA) for time 1 (2015) will complete more CUSP Passport challenges.	* CUSP teams active as of October 2, 2015. * Included in the Safety Culture Assessment 2015 - ≥ 50% response rate.	* CUSP teams inactive as of October 2, 2015. * Excluded in the Safety Culture Assessment 2015 - < 50% response rate.
Aim 2: To compare the accomplishment of challenges on the CUSP Passport with a change in the teamwork and safety domain scores on the SCA survey from 2015 to 2017.	* CUSP teams active as of October 2, 2015. * Safety Culture Assessment 2015 and 2017 - > 50% response rate.	* CUSP teams inactive as of October 2, 2015. * Safety Culture Assessment 2015 – < 50% response rate.

Appendix 9 Independent and Dependent Variables

Hypothesis	**Variable**	**Independent or Dependent**	**Variable Type**	**Data Source**
Hypothesis 1.1 CUSP teams who have stronger teamwork domain scores in the 2015 Safety Culture Assessment will complete more CUSP Passport challenges than those who do not have strong SCA scores.	Time 1 Safety Culture Assessment score (2015)	Independent	Continuous	Pascal Metrics (vendor) and JHM Patient Safety database
	Unit type, Unit size	Independent	Categorical	JHM Patient Safety CUSP database
	Number of CUSP Passport challenges completed	Dependent	Continuous	JHM Patient Safety CUSP Passport database
Hypothesis 1.2 CUSP teams who have stronger safety domain scores in the2015 Safety Culture Assessment will complete more CUSP Passport challenges than those who do not have strong SCA scores.	Time 1 Safety Culture Assessment score (2015)	Independent	Continuous	Pascal Metrics (vendor) and JHM Patient Safety database
	Unit type, Unit size	Independent	Categorical	JHM Patient Safety CUSP database
	Number of CUSP Passport challenges completed	Dependent	Continuous	JHM Patient Safety CUSP Passport database
Hypothesis 2.1 CUSP teams who complete more Passport challenges will show improved teamwork domain scores on the 2017 SCA compared to 2015, than those who	CUSP Essential Team Behaviors Passport clusters	Independent	Continuous	JHM Patient Safety CUSP Passport database
	Difference between Safety Culture Assessment, Teamwork	Dependent	Continuous	Pascal Metrics (vendor) and JHM Patient

Hypothesis	**Variable**	**Independent or Dependent**	**Variable Type**	**Data Source**
do not complete Passport challenges.	Domain Score Time 2 – Time 1			Safety database
Hypothesis 2.2 CUSP teams who complete more Passport challenges will show improved safety domain scores on the 2017 SCA compared to 2015, than those who do not complete Passport challenges.	CUSP Essential Team Behaviors Passport clusters Difference between Safety Culture Assessment, Safety Domain Score Time 2 – Time 1	Independent Dependent	Continuous Continuous	JHM Patient Safety Pascal Metrics (vendor) and JHM Patient Safety database
Hypothesis 2.3 CUSP teams who complete more Passport challenges will have a higher score for an individual question in the Teamwork Domain, "People in this work setting work together as a well-coordinated team".	CUSP Essential Team Behaviors Passport clusters Difference between Safety Culture Assessment, Teamwork Individual Question Score Time 2 – Time 1	Independent Dependent	Continuous Continuous	JHM Patient Safety Pascal Metrics (vendor) and JHM Patient Safety database
Hypothesis 2.4 CUSP teams who complete more Passport challenges will have a higher score for an individual question in the Safety Culture Domain, "I am encouraged by others in this work setting to report any patient safety concerns I may have".	CUSP Essential Team Behaviors Passport clusters Difference between Safety Culture Assessment, Safety Culture Individual Question Score Time 2 – Time 1	Independent Dependent	Continuous Continuous	JHM Patient Safety Pascal Metrics (vendor) and JHM Patient Safety database

Appendix 10 Data Timeline



Appendix 11 Threats to Validity

Internal Validity	**Description**
History	Without a control group or randomization, it is difficult to control for the influences around each CUSP team.
Maturation	This is a valid threat although the length of the evaluation project will be anticipated at just over 1 year. CUSP teams are anticipated to mature with each year beginning with kick-off.
Testing	The testing threat is possible, given that the pre-test and the post-test for the Safety Culture Assessment survey may affect some participant responses.
Instrumentation	This threat is not considered strong, since the Safety Culture Assessment survey has been validated.
Statistical Regression	This is not considered a threat since the participants are already identified from CUSP team program tracking and there are no known extremes. However, CUSP teams with certain supports such as unit manager engagement may score stronger in CUSP Passport activity challenges than others.
Selection Bias	There will be some selection bias, given that CUSP team history of accomplishment is somewhat known by the CUSP Core Team.
Attrition	Attrition is somewhat regular in CUSP team core positions, such as the CUSP unit manager and the CUSP champion.
Selection-maturation Interaction	This is not considered a threat for this evaluation.
Selection-history Interaction	This is not considered a threat for this evaluation.
External Validity	**Description**
Testing-treatment Interaction	This is considered a medium threat in this evaluation, since the same test will be administered to assess the correlation of safety and teamwork domains with the CUSP Essential Skills Passport safety work.
Selection-treatment Interaction	This is considered a valid threat given that there is no randomization and the effects may be true only for the intervention group.
Reactive-situational Effects	This is considered a valid threat given that this is not a randomized control trial.
Multiple Treatment Effects	This is also considered a valid threat given that there may be multiple exposures to safety training and treatment. This could be difficult to control and present a threat to external validity.

Appendix 12 Analyses Methods

Hypothesis	Method	Results
Hypothesis 1.1	Based on the assumption of sufficient CUSP passport submissions, we designed a Multiple Linear Regression model. Changed to Zero-inflated Poisson Regression model due to the small sample size with an excess of zero completed CUSP passport task counts.[37] The variance of completed CUSP passport tasks is much larger than the mean (mean=3.17, variance=26.09), changed to Zero-inflated Negative Binomial Regression.* The Vuong test result suggested using a Standard Negative Binomial Regression.	Significance (IRR=1.03, 95% CI: 1.005-1.057, p=0.021)
Hypothesis 1.2	Applied a Zero-inflated Negative Binomial Regression model first. The Vuong test result suggested using a Standard Negative Binomial Regression.	No significant results (IRR=1.02, 95% CI: 0.998-1.050, p=0.068)
Hypothesis 2.1 Hypothesis 2.2 Hypothesis 2.3 Hypothesis 2.4	Multiple Linear Regression	No significant results (teamwork – β=0.17, 95% CI: -0.311, 0.652,F p=0.483), (safety climate – β=0.21, 95% CI: -0.374, 0.789, p=0.479)

April 20, 2018

CURRICULUM VITAE

Paula S. Kent, MSN, MBA, RN, CPPS

Business:
The Armstrong Institute for Patient Safety & Quality
15th Floor
750 East Pratt Street
Baltimore, Maryland 21202
pkent2@jhmi.edu (email)
410-952-0673 (cell)

Professional Objectives
To utilize my expertise in healthcare leadership and the administration of programs toward the improvement of patient safety and service excellence, and for the benefit of an organization. My professional objectives currently include utilization of my advanced degree (upon completion of DrPH in Health Policy and Management) and experience in a leadership position.

Education
The Johns Hopkins University Bloomberg School of Public Health, Baltimore, MD. Doctor of Public Health in Health Policy and Management, projected completion May 2018

The Johns Hopkins University, Baltimore, MD. Master of Science in Nursing Health Systems and Master of Business Administration, May 2005

The Johns Hopkins University, Baltimore, MD. The Business of Nursing, a Graduate Certificate Program, July 2001

University of Maryland at Baltimore County School of Nursing, Baltimore, MD. Bachelor of Science in Nursing, May 1985

Sisters of Charity Hospital School of Nursing, Buffalo, NY. Diploma in Nursing, May 1979

Professional Experience

The Johns Hopkins University and the Johns Hopkins Armstrong Institute for Patient Safety and Quality 2017 – present, Patient Safety Specialist for Global Collaborations
The Johns Hopkins Hospital and The Armstrong Institute for Patient Safety and Quality 2014 – 2017, Patient Safety Coordinator for Strategic Partnerships
The Johns Hopkins Hospital and The Armstrong Institute for Patient Safety and Quality 2010 - 2014, Patient Safety Coordinator
The Johns Hopkins Hospital 2007 – 2010, Patient Safety Coordinator

Responsible as a subject matter expert for the Global Collaborations Team at the Armstrong Institute with expertise on clinical issues and patient safety programs. Involvement with external partners includes management of Comprehensive Unit-based Safety Program (CUSP) and Fellowship programs for patient safety improvement, the safety culture assessment, and organizational assessment. Responsible for planning, implementing and/or evaluating defined safety programs throughout the Johns Hopkins Hospital. Provide a direct resource with clinical and technical expertise on the methods and practice of improvement projects to departments. Oversight of the Comprehensive Unit Based Safety (CUSP) teams to ensure that implementation goals are met and the administration of the Safety Culture Survey assessment at the organization level, with debriefing experience at the leadership and work setting levels. Responsibility for oversight and management of the TeamSTEPPS training program at Armstrong Institute. Expertise with training programs includes CUSP, TeamSTEPPS, Friday Night at the ER, and the 5 Day Patient Safety Certificate Program Presentation topics frequently include Safety Culture and Safety Culture Debriefing, CUSP, and Teamwork and Communication.

2000 – 2007, Program Coordinator
1989 - 2000, Nursing Staff Assistant
Assisted the Director of Nursing with management of programs and projects throughout the Department of Surgery (greater than 800 FTEs). Managed the retention and recognition programs in nursing, facilitated recruitment for difficult to fill positions, and produced and analyzed staffing reports. Represented Surgery on the JHHS Business Continuity and Emergency Management Committees and developed alternate plans for disaster or systems down.

1985 - 1988, Nurse Manager, Intermediate Care Unit
Managed a 24-bed critical care unit, including personnel (45 FTEs), budget ($1 million labor and $2 million expense), and supplies, and department and hospital committee support.

1979 - 1987, Nursing Graduate, Clinical Nurse, and Senior Clinical Nurse, Intermediate Care Unit
Provided direct care to critical care patients, precepted new staff, managed charge nurse responsibilities, chaired committees, and assumed staff development and teaching responsibilities. Developed a senior nurse team responsible for managing the Intermediate Care Unit for one year.

Publications

Weaver, S.J., Mossburg, S.E., Pillari, M.S., **Kent, P**., Daugherty Biddison, E.L. **Examining variation in mental models of influence and leadership among nursing leaders and direct care nurses**. Journal of Nursing Care Quality. In press, June 2017.

Latif, A., Kelly, B., Edrees, H., **Kent, P.S**., Weaver, S.J., Jovanovic, B., Attallah, H., de Grouchy, K.K., Al-Obaidli, A., Goeschel, C.A., & Berenholtz, S.M. (accepted for publication March 2015). **Implementing a Multifaceted Intervention to Decrease Central Line - Associated Bloodstream Infections in SEHA (Abu Dhabi Health Services Company) Intensive Care Units: The Abu Dhabi Experience,** *Infection Control and Hospital Epidemiology, 00*(0):1– 7.

Aboumatar, H.J., Thompson, D., Wu, A., Dawson, P., Colbert, J., Marsteller, J., **Kent, P**., Lubomski, L.H., Paine, L., & Pronovost, P. (2011). **Development and evaluation of a 3-day patient safety curriculum to advance knowledge, self-efficacy, and system thinking among medical students**, *BMJ Quality & Safety Online First*, http://qualitysafety.bmj.com/content/early/2012/03/14/bmjqs-2011-000463.full.pdf+html

Timmel, J., **Kent, P.S.,** Holzmueller, C.G., Paine, L., Schulick, R.D., & Pronovost, P.J. (2010). **Impact of the comprehensive unit-based safety program (CUSP) on safety culture in a surgical inpatient unit,** *The Joint Commission Journal on Quality and Patient Safety, 36*(6), 252-260.

Paine, L.A., Rosenstein, B.J., Sexton, J.B., **Kent, P**., Holzmueller, C.G., & Pronovost, P.J. (2010). **Assessing and improving safety culture throughout an academic medical centre: A prospective cohort study,** *Quality and Safety in Health Care*, 19, 547-554.

Kent, P., Paine, L., and Timmel, J. (March/April 2010). **Comprehensive unit-based safety program (CUSP): Cohorting, multidisciplinary rounds, and daily goals,** *American Journal of Medical Quality*, 25 (2): 31S.

Holzmueller, C.G., Timmel, J., **Kent, P.S.**, Schulick, R.D., & Pronovost, P.J. (2009). **Implementing a team-based daily goals sheet in a non-ICU setting,** *The Joint Commission Journal on Quality and Patient Safety*, 35(7):384-388.

Kent, P. (2007). **Lifestyle changes following bariatric surgery**, *Bariatric Nursing and Surgical Patient Care, 2*(3), 209-214.

Presentations

January 2018 - Presented "Why Patient Safety Matters" to the Chinese Delegation of Safety leaders at the Institute for Johns Hopkins Nursing.
November 2017 – Presented "Caring for the Caregiver" at Tawam Hospital in the UAE for World Quality Day Conference.

April 2017 – Presented "CUSP for Organizational Leadership in Healthcare" for HMV Leadership at Hospital Moinhos de Vento (HMV) in Brazil.

March 2017 – Presented "Safety Culture: Assessment, Programs and Tools for Leading a Culture of Safety" at the Johns Hopkins Bloomberg School of Public Health for the Healthcare Quality and Patient Safety – A Management Perspective course.

March 2017 – Presented "Safety Culture: Assessment, Programs and Tools for Leading a Culture of Safety" at Hershey Medical Center for the Health Science Academy course in the School of Medicine.

January 2017 – Presented "JHAH Project Work: Overview of Teams from Year 2" and "HSOPS History and What it Measures: The AI Experience" at the International Symposium in Saudi Arabia sponsored by the Armstrong Institute for Patient Safety and Quality.

January 9, 2017 – Presented "Why Patient Safety Matters" to the Chinese Delegation of Safety leaders at the JHU SON.

December 22, 2016 – Presented "The HSOPS Survey: What it Means and What to do with the Results" Webinar for the Navy Medicine Program for Patient Safety with the Armstrong Institute.

June 2016 – Presented "HSOPS Debrief Webinar" for New York State Partners for Patient Safety.

February 2016 – Presented "Speaking Up – Hallmark of a Safety Culture" and "Patient Safety Culture Assessment Experience at JHAH using the HSOPS Survey" at the International Workshop in Saudi Arabia sponsored by the Armstrong Institute for Patient Safety and Quality.

January 12, 2015 – Presented "Learning From What Goes Wrong: Error Reporting for Learning and Transparency" for the International Workshop in Saudi Arabia sponsored by the Armstrong Institute for Patient Safety and Quality.

January 11, 2015 – Presented "Lessons from High Reliability Science: Leadership, Culture, and Robust Process Improvement" for the International Workshop in Saudi Arabia sponsored by the Armstrong Institute for Patient Safety and Quality.

December 9, 2014 – Presented "CUSP Readiness and Overcoming Barriers" for the Patient Safety Practitioner Certificate Workshop sponsored by the Armstrong Institute for Patient Safety and Quality.

November 12, 2014 – Presented "Organizational Culture:
Safe, Just and Highly Reliable" for Mt Sinai Medical Center as part of the safety assessment conducted for the Armstrong Institute for Patient Safety and Quality.

October 8, 2014 – Presented "Why Patient Safety Matters" for the International Visitors at the Institute for Johns Hopkins Nursing.

September 9, 2014 – Presented "CUSP Readiness and Overcoming Barriers" for the Patient Safety Practitioner Certificate Workshop sponsored by the Armstrong Institute for Patient Safety and Quality.

September 16-17, 2014 – Team-presented new JHM CUSP Workshop sponsored by the Armstrong Institute for Patient Safety and Quality with Cheryl Connors for The All Children's Hospital in St Petersburg, Florida.

February 4, 2014 – Presented "CUSP Readiness and Overcoming Barriers" for the Patient Safety Practitioner Certificate Workshop sponsored by the Armstrong Institute for Patient Safety and Quality.

January 7-8, 2014 – Presented multiple sessions for the "CUSP Workshop" sponsored by the Armstrong Institute for Patient Safety and Quality.

November 5, 2013 – Presented "CUSP Readiness and Overcoming Barriers" for the Patient Safety Practitioner Certificate Workshop sponsored by the Armstrong Institute for Patient Safety and Quality.

October 21-22, 2013 – Presented multiple sessions for the "CUSP Workshop" sponsored by the Armstrong Institute for Patient Safety and Quality.

October 6-7, 2013 – Presented "Safety Survey Debriefing for Leadership" at All Children's Hospital in St. Petersburg, Florida.

September 26-27, 2013 – Presented multiple sessions for the "CUSP Workshop" sponsored by the Armstrong Institute for Patient Safety and Quality.

September 24, 2013 – Presented "Safety Survey Debriefing for Leadership" at Sibley Hospital in Washington, DC.

May 6-7, 2013 – Presented multiple sessions for the "CUSP Workshop" sponsored by the Armstrong Institute for Patient Safety and Quality.

February 23, 2013 – Presented "Decreasing Central Line Associated Blood Stream Infections" at the el XV Congreso Internacional Avances en Medicina Hospitales Civiles de Guadalajara 2013 in Guadalajara, Mexico.

February 12, 2013 – Presented "CUSP Readiness and Overcoming Barriers" for the Patient Safety Practitioner Certificate Workshop sponsored by the Armstrong Institute for Patient Safety and Quality.

January 2013 – Presented "Why Patient Safety Matters" for the International Visitors at the Institute for Johns Hopkins Nursing

January 14-15, 2013 – Presented multiple sessions for the "CUSP Workshop" sponsored by the Armstrong Institute for Patient Safety and Quality.

January 2-4, 2013 – Presented several sessions on "Assertive Communication Techniques" for the Johns Hopkins University School of Medicine Safety Intersession.

October 22, 2012 – Presented multiple sessions for the "CUSP Workshop" sponsored by the Armstrong Institute for Patient Safety and Quality at Sibley Memorial Hospital.

October 15-16, 2012 – Presented multiple sessions for the "CUSP Workshop" sponsored by the Armstrong Institute for Patient Safety and Quality.

September 2012 – Presented "Why Patient Safety Matters" for the International Visitors at the Institute for Johns Hopkins Nursing.

September 17-19, 2012 – Presented multiple sessions for the "Patient Safety Practitioner Certificate Workshop" sponsored by the Armstrong Institute for Patient Safety and Quality.

December 2011 – Presented "Why Patient Safety Matters" for the International Visitors at the Institute for Johns Hopkins Nursing.

October 17 – 19, 2011 – Presented multiple sessions for the "Safety

Practitioner Workshop" sponsored by the Armstrong Institute for Patient Safety and Quality.

October 14, 2011 – Presented "Interprofessional Team Communication Simulation: a collaborative educational activity of the Johns Hopkins University Schools of Nursing and Medicine" with Dr. Susan Immelt at the 2011 MNA Annual Conference: Leadership for Healthcare Change – The Future of Nursing at the Anne Arundel Medical Center.

June 29 – July 1, 2011 – Presented "Creating a Patient Safety Culture" and "The Importance of a Strategic Safety Plan" at the Health Leader Summit in Merida Yucatan, Mexico.

June 2011 – Presented "Why Patient Safety Matters" for the International Visitors at the Institute for Johns Hopkins Nursing.

January 18-19, 2011 – Presented multiple sessions for the "Patient Safety Practitioner Workshop" sponsored by the Armstrong Institute for Patient Safety and Quality.

January 18, 2011 – Presented "The Role of the CUSP Coach" for the On The CUSP: Stop BSI mid course meeting as part of the South Carolina Hospital Association Meeting.

December 2010 – Presented 7 hour Patient Safety Officer Workshop for frontline staff and managers at Aintree University Hospital in Liverpool, England.

November 2010 – Presented "Why Patient Safety Matters" at the Gettysburg Memorial Lecture at Gettysburg Hospital as part of a memorial education program for nursing with Sorrel King.

September 2010 – Presented "Organizational Systems and Structures: Patient Safety-related Committees and Patient Safety Event Reporting" for the Patient Safety Practitioner Certificate Program at the Center for Innovation in Quality Patient Care Baltimore, MD.

August 2010 – Presented two talks on "Managing Patient Safety Cases and Best Practices in Patient Safety" as part of a panel and on "Improving Communication with the Patient and Family to Improve Patient Safety" as a break out session at the Health Management Asia Conference in Seoul, South Korea for Johns Hopkins Medicine International and the Center for Innovations.

May 2010 – Presented "Patient Safety in Action" for the National University of Singapore Advanced Practice Nurses at the Institute for Johns Hopkins Nursing.

April 2010 – Presented "Creating an OR Comprehensive Unit-Based Safety Program (CUSP)" for Perioperative Workshop at the Center for Innovation in Quality Patient Care Baltimore, MD.

October 2009 – Presented podium talk at the University HealthSystem Consortium (UHC) Fall Forum on "Weinberg 4C Comprehensive Unit-based Safety Program (CUSP): Multidisciplinary Rounds and Daily Goals" in Atlanta, Georgia.

August 2009 – Presented plenary talk on "The Role of Nurses in Patient Safety" and a break out session on "Teamwork and Communication" at the Health Management Asia Conference in Ho Chi Minh City, Viet Nam for Johns Hopkins Medicine International and the Center for Innovations

May 2009 – Presented lecture on "Patient Safety Net: More than Just an Automated System" for the Wilmer Nursing Conference in Baltimore, MD.

April 2008 – Presented on the "Science of Safety" for CUSP team members and Patient Safety Officers at Tawam Hospital in Al Ain, UAE. Also consulted with CUSP team leadership and hospital leadership on the safety culture and progress of CUSP at Tawam Hospital.

May and September, 1985 – Presented lecture on Professional Practice to undergraduate class at the University of Maryland in Baltimore County.

Posters

June 2014 - Weaver SJ, **Kent PS**, Paine LA, Sawyer MD, Daugherty-Biddison E, 2014, Safety Climate and Infection Control Adherence Behaviors among Acute Care Providers, 5th Annual Johns Hopkins Medicine Patient Safety Summit, Baltimore, MD.

June 2012 - Weaver S, Paine L, Sawyer M, **Kent P**, Pronovost P, June 2012, A Cross-sectional Analysis Comparing Safety Culture Profile Characteristics in CUSP vs. Non-CUSP Work Areas, 3rd Annual Johns Hopkins Medicine Patient Safety Summit, Baltimore, MD.

June 2011 - Aboumatar H, Thompson D, Wu A, Dawson P, Colbert J, Marsteller, **Kent P**, Lubomski L, Paine L, Pronovost P, 2011, The Patient Safety Intersession: Three days of Learning to Educate and Empower Medical Students, Johns Hopkins University School of Medicine: Genes to Society Faculty Retreat, Baltimore, MD.

June 2011 - Aboumatar H, Thompson D, Wu A, Dawson P, Colbert J,

Marsteller, **Kent P**, Lubomski L, Paine L, Pronovost P, 2011, The Patient Safety Intersession: Three days of Learning to Educate and Empower Medical Students, AAMC Integrating Quality Meeting, Chicago, IL.

September 2009 - Posters presented at the Scholar's Day at the Johns Hopkins Hospital in Baltimore, MD. (Creativity in Addressing some of the Biggest Factors Impacting Patient Safety on an Inpatient Comprehensive Rehabilitation Unit (Halsted 3), Weinberg 4C CUSP: Cohorting, Multidisciplinary Rounds, and Daily Goals, and the Patient Safety Lecture Series)

May 2009 – Poster presented at the National Patient Safety Congress in Washington, DC (Weinberg 4C CUSP: Cohorting, Multidisciplinary Rounds, and Daily Goals)

April 2009 – Posters presented at the Maryland Patient Safety Conference in Baltimore, MD. (Creativity in Addressing some of the Biggest Factors Impacting Patient Safety on an Inpatient Comprehensive Rehabilitation Unit (Halsted 3), Weinberg 4C CUSP: Cohorting, Multidisciplinary Rounds, and Daily Goals, and the Patient Safety Lecture Series)

May 2008 – Posters presented at the National Patient Safety Congress in Nashville, TN (Decreasing Patient Falls on Weinberg 5B, an Inpatient Oncology Unit and Handoff Communication Project on Halsted 3, a Comprehensive Inpatient Rehabilitation Unit).

March 2008 – Posters presented at the Maryland Patient Safety Conference in Baltimore, MD. (Handoff Communication Project on Halsted 3 and Reduction of Patient Falls on an Oncology Inpatient Unit – Weinberg 5B)

April 2006 – Poster presented at AORN National Congress in Washington, DC. (Improved Control of Body Temperature in the Surgical Patient to Improve the Incidence of Surgical Site Infection)

April 2004 – Poster presented at AORN National Congress in San Diego, CA. (Investing in our Future Stars of Tomorrow)

Professional

January 2018 – Subject Matter Expert for patient safety review and CUSP education at Kiwoko Hospital in Kiwoko, Uganda.

December 2017 – Project support and Lead for CUSP Workshop training in Enugu, Nigeria.

November 2017 – Presentation and program consult for World Quality Day celebrations at Tawam Hospital in Al Ain, United Arab Emirates

April 2017 – Co-presented CUSP training for HMV staff at Hospital Moinhos de Vento (HMV) in Brazil.

March 2017 – Project Lead for TeamSTEPPS master training at Tawam Hospital in Al Ain, United Arab Emirates.

December 2016 – Project Lead for TeamSTEPPS master training at King AbdulAziz Medical City in Jeddah, Saudi Arabia

December 2016 – Project support and Lead for CUSP Workshop training in Enugu, Nigeria.

November 2015 – Project support and co-Facilitator for CUSP and TeamSTEPPS training at Kiwoko Hospital in Kiwoko, Uganda.

October 2015 – Co-Facilitator of the CUSP Workshop at Queens Medical Center in Honolulu, Hawaii with AI Faculty.

October 2015 – Co-Facilitator of the CUSP Workshop for the Michigan Hospital Association in Detroit and Marquette, Michigan with AI Faculty.

September 2015 – Co-Facilitator of the TeamSTEPPS Workshop at Johns Hopkins Aramco Healthcare in Dammam, Saudi Arabia with AI Faculty.

July 2015 – Patient Safety Culture Expertise and Project Support with the Armstrong Institute for Patient Safety and Quality during the organizational assessment at Queens Medical Center in Honolulu, HI.

April 2015 - Weaver S.J., **Kent, P.S.**, Paine, L.A., Sawyer, M.D., Pillari, M.S., & Daugherty Biddison, E. Examining variation in nurses' mental models of influence and leadership. Panel presentation by Weaver at the 30th annual meeting of the Society for Industrial and Organizational Psychology; Philadelphia, PA.

January 20, 2015 – Primary facilitator of the CUSP Workshop offered at Sibley Memorial Hospital in Washington, DC for the Armstrong Institute for Patient Safety and Quality.

January 13, 2015 – Primary facilitator of the Fellowship Workshop offered as part of the International Workshop in Saudi Arabia sponsored by the Armstrong Institute for Patient Safety and Quality.

August 2014 – present – Project Support with the Armstrong Institute for Patient Safety and Quality for Johns Hopkins Aramco Healthcare.

August 2014 – February 2015 – Project Lead with the Armstrong Institute for Patient Safety and Quality for Al Rahba (UAE) Patient Safety Certificate Program.

August 2014 – December 2014 - Project Lead with the Armstrong Institute for Patient Safety and Quality for Mt. Sinai (Florida) patient safety assessment.

July 15, 2014 – Facilitated the game platform for new JHM CUSP Workshop sponsored by the Armstrong Institute for Patient Safety and Quality.

2014 (April 24-30) – Member of the Saudi Aramco project team in the Armstrong Institute to visit Saudi Arabia and the Johns Hopkins Aramco Healthcare site for patient safety consultation

2014 (March) – Subject Matter Expert for two patient safety case studies prepared for Wolters Kluwer Health, subsidiary of Lippincott Williams & Wilkins.

2013 – 2015 - Member of the Johns Hopkins Hospital Patient Family Advisory Council Executive Committee

2012 – present – Member of the CUSP Network project team in the Armstrong Institute to improve patient safety and further develop the CUSP Program

2012 – 2014 – Member of the Abu Dhabi project team in the Armstrong Institute to improve patient safety and decrease CLABSIs with the CUSP Program. Co-author of the following:

1) Edrees, H.; Berenholtz, S.M.; Goeschel, C. A.; Latif, A; Kelly, B.; Attallah, H.; Weaver, S.; Jovanovic; B.; Yang, T.; Kent, P.; AlObaidli, A. (May 14-16, 2014) "Implementing the Johns Hopkins CUSP program to reduce central line associated bloodstream infections in SEHA ICU's—Abu Dhabi" 16th Annual National Patient Safety Foundation Patient Safety Congress: Orlando, Florida [Poster Presentation: Accepted]
2) Edrees, H.; Berenholtz, S.M.; Goeschel, C. A.; Latif, A; Kelly, B.; Attallah, H.; Weaver, S.; Jovanovic; B.; Yang, T.; Kent, P.; AlObaidli, A. (April 8-11, 2014) "Implementing the Johns Hopkins CUSP program to reduce central line associated bloodstream infections in SEHA ICU's—Abu Dhabi" *British Medical Journal (BMJ)* & Institute for Healthcare Improvement (IHI): International Forum on Quality and Safety in Healthcare, Paris, France [Poster Presentation]

3) Edrees, H.; Berenholtz, S.M.; Goeschel, C. A.; Latif, A; Kelly, B.; Attallah, H.; Weaver, S.; Jovanovic; B.; Yang, T.; Kent, P.; AlObaidli, A. (December 4, 2013) "Implementing the Johns Hopkins CUSP program to reduce central line associated bloodstream infections in SEHA ICU's—Abu Dhabi" 15th Annual Department of Anesthesiology & Critical Care Medicine Research Day: Johns Hopkins Hospital, Baltimore, MD [Poster Presentation]

2011 – present – Member of the Armstrong Institute for Patient Safety and Quality Patient Safety Fellowship Program team

2011 – present – Member of the Johns Hopkins Hospital Provider Behavior Research Group

2011 – present - Member of the Johns Hopkins Hospital Patient Family Advisory Council

November 29, 2011 – Taped the "Assessing for CUSP Readiness Webinar" for use by the Armstrong Institute for Patient Safety and Quality in work throughout the Institute on patient safety and quality.

October, 2011 – Co-Investigator for the Blaustein Pain Grant "Strategy to Improve Postoperative Pain Management in the Postsurgical Units" with Principal Investigator, Dr. Marie Hanna, and Co-Investigator, Joanne Timmel, RN.

August 3, 2011 – Taped the "CUSP Coach Webinar" for use by the Armstrong Institute for Patient Safety and Quality in work throughout the Institute on patient safety and quality.

July, 2011 – Member of the Selection Committee for the Patient Safety Project Award, presented in conjunction with the Health Management Asia Conference in Singapore, 2011.

March 10, 2011 – Subject Matter Expert for the Urban Health Radio Program on "Patient Safety" with Lori Paine and Cheri Wilson, aired in Baltimore, MD.

July, 2010 – Member of the Selection Committees for the Patient Safety/Quality Medical Care Project Award and the Internal Customer Service Project Award, presented in conjunction with the Health Management Asia Conference in South Korea, 2010.

September, 2009 – July 2011 – Project Manager of the Institute for Healthcare Improvement (IHI) and Macy Foundation Grant at the

Johns Hopkins University SON. The goal of the grant is to improve the knowledge and skills of nursing and medical students in the areas of quality, safety and quality improvement (QI).

April, 2008 – Coordinated the training of Safety Officers in the Comprehensive Unit-based Safety Program (CUSP) and facilitated the establishment of three CUSP teams at Tawam Hospital in Al Ain, UAE.

September 2007 – present – Developed an online Patient Safety Curriculum for Patient Safety Officers and Comprehensive Unit-based Safety Program (CUSP) Coaches at JHH with colleagues at JHH and JHU School of Nursing.

January – May, 2005 – Developed a quality improvement plan with an interdisciplinary team as part of the ACT II initiative, a program of the Robert Wood Johnson Foundation. One of two teams to present to the Foundation in June 2005 in Boston.

Awards and Recognition

The Heritage Award honors alumni and friends of Johns Hopkins University who have contributed outstanding service over an extended period to the progress of the University or the activities of the Alumni Association. April 2018.

June Culley Doctoral Award for "demonstration of potential in the field of public health" for Health Policy and Management students. March 2017.

Outstanding Team Award for the JHM Patient Safety Summit given by JHM Patient Safety. November 2016.

Jo Walrath Award for Service Excellence given by the JHH Department of Surgical Nursing. May 2007.

Leadership Award for "graduate student demonstrating outstanding leadership in the field of nursing." Johns Hopkins University School of Nursing. May 2005.

Sigma Theta Tau, International Honor Society of Nursing, 1985.

Memberships

Member of the **Johns Hopkins University Alumni Council Executive Committee** 2012 – present
Member of the **Johns Hopkins University Alumni Association Awards and Nominations Committee** 2012 – present

President of the **Johns Hopkins University School of Nursing Alumni Association Board** 2012 – 2014
Vice President of the **Johns Hopkins University School of Nursing Alumni Association Board** 2011 - 2012
Treasurer of the **Johns Hopkins University School of Nursing Alumni Association Board** 2010 - 2011
Chairperson of the **Johns Hopkins University School of Nursing Alumni Association Homecoming Committee** 2007 - 2012
Member of the **Johns Hopkins University School of Nursing Alumni Association Board** since 2006
Member of **Sigma Theta Tau,** International Honor Society of Nursing since 1985
Member of **AACN** and **CCRN certification,** Critical Care Nursing (inactive)

Licenses and Certificates

Certified Professional in Patient Safety, 2016, SC3114487 (active)
Registered Nurse, Maryland, 1979, R070880
Registered Nurse, New York, 1979, (inactive)